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The American Gas Engineering Journal.

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The Gas Appliance Testing Laboratory—Part X

A Means of Determining Value of Fireless Cooker Becomes Important in Connection With Gas Range—the Gas Toaster and Other Small Appliances

By H. M. RILEY and L. B. WILSON, JR.

During the past few years manufacturers of gas ranges have been devoting some thought and study to the fireless cooking principle, with the result that we can undoubtedly look forward to the time in the near future when this most common of all gas appliances will operate on a much more efficient scale than it now does. At the same time, many gas companies have found it profitable to handle for sale purposes the ordinary fireless cooker as well as the fireless cooker gas range. It would therefore be considered essential that the laboratory man thoroughly understand the working principles of each, and likewise be able to apply a quantitative estimate of the worth of the different styles and makes of this appliance.

To the average layman, and even to some technically trained, the operation of a fireless cooker is surrounded by an atmosphere of mystery. This is probably due to the fact that one has been accustomed, when considering the operation of cooking, to think of outrageously hot coal ranges and the like, with the attendant great expenditure of unused thermal energy. In other words, then, our childhood's pleasant recollections of the kitchen in winter, and purgatorial memories of the same in summer, have left us with a very false notion as to how much heat is really utilized in cooking a meal. Hence, the majority of us have been floating blandly along super-satisfied with our gas range, until the electric range, with its relatively high efficiency, rightly caused us to suddenly look into the fireless cooker principle with more than passing interest. Accordingly, appliance men have been investigating the quantitative side of cooking and are generally surprised when they find out that, as a general proposition, but very little thermal energy is required to cook our food. It would be well to examine this latter statement a little closer by means of a numerical example.

Two fireless cooker stones, each weighing 7.28 lb., were heated to 450 deg. Fahr. temperature and placed in a compartment containing seven white potatoes of nearly the same size and weighing 1.88 lb. At the end of the cooking time the potatoes were removed in a baked condition and were found to weigh 1.68 lb. It is evident that 0.20 lb. of water must have been evaporated from the potatoes. Below are the calculations:

Temperature of stones at start.	70 deg. Fahr.
Temperature of stones at end..	450 deg. Fahr.
Rise in temperature.....	380 deg. Fahr.

Now, since the stones are essentially talc in their composition, the specific heat is probably close to 0.22. Hence the heat in the stones at 450 deg. Fahr. is: $(450 - 32) \times 7.28 \times 2 \times 0.22 = 1339$ B.t.u. Also the heat imparted to the stones equals: $(450 - 70) \times 14.56 \times 0.22 = 1217$ B.t.u.

In order to heat the stones 9.50 cu. ft. of 560 B.t.u. gas were consumed, or $9.5 \times 560 = 5320$ B.t.u.

Efficiency of heating up stones—

$$\frac{1217 \times 100}{5320} = 23 \text{ per cent}$$

The percentage of water in potatoes is about 78. Therefore, there were $0.78 \times 1.88 = 1.47$ lb. of water originally and $1.88 - 1.47 = 0.41$ lb. potato substance. Assume specific heat of potato substance 0.20 and also that even though the stones were heated to 450 deg. Fahr. the potatoes did not attain a temperature higher than 375 deg. Fahr. From these assumptions we can roughly figure the useful heat absorbed in doing the baking of the potatoes.

Heating and evaporating water—

1.47 lb. $(212 - 70)$	= 209 B.t.u.	
0.20 lb. $\times$ 970.4 B.t.u.	= 194 B.t.u.	(evaporation)
Total	403 B.t.u.	

Heating potato substance—

$0.41 \times (375 - 70) \times 0.20$	= 25 B.t.u.
Total heat usefully used	= 428 B.t.u.
Efficiency $= \frac{428 \times 100}{1339}$	= 32 per cent
Absolute efficiency = 32 per cent $\times$ 23 per cent	= 7.4 per cent

As a comparison with the above results, let us examine some similar calculations based on performing a

like cooking operation by means of the ordinary gas range.

Weight of potatoes before cooking, 2.02 lb.
Weight of potatoes after cooking, 1.72 lb.
Gas consumption, 30 cu. ft.
B.t.u. value of gas, 565.
Temperature at start, 72 deg. Fahr.
Total heat expended, $30 \times 565 = 16950$ B.t.u.
$2.02 \times 0.78 = 1.58$ lb. of water originally in potatoes.
$2.02 - 1.58 = 0.44$ lb. potato substance.

Assuming temperature of potato substance is raised to 450 deg. Fahr., 1.58 lb. $(212 - 72) = 221$ B.t.u. used in heating up potato moisture. Now—

$2.02 - 1.72 \times 0.30$ lb. moisture evaporated.
0.30 lb. $\times$ 970.4 B.t.u. = 291 B.t.u. used in evaporation.
Total B.t.u. usefully used on moisture, $291 + 221 = 512$.
$0.44 \times (450 - 72) \times 0.20 = 37$ B.t.u. used in heating potato substance.
Hence 549 B.t.u. were usefully used.

$$\text{Efficiency} = \frac{549 \times 100 \text{ per cent}}{16950} = 3.3 \text{ per cent}$$

It should be recognized that the above calculations might be subject to some adverse criticism and correction, for the reason that no account has been taken of the amount of thermal energy absorbed in effecting certain chemical changes which have undoubtedly taken place, such as changing starch into sugar, etc. Also, it is quite doubtful whether the solid portion of the potato attains the temperature as noted in the calculations. Indeed, if we consider that the potato really boils in its own moisture, which is possibly the state of affairs in the case of the fireless cooker, the potato substance never reaches a much higher temperature than 212 deg. Fahr.

Also, in the case of cooking the potatoes in the ordinary gas range, the phenomena are somewhat different. In the first place, there has evidently taken place some slight oxidation which diminishes from the outside to the inside of the potato, and at the same time some other portion has certainly attained a much higher temperature than 212 deg. Fahr. At all events, we believe that, rough as the above

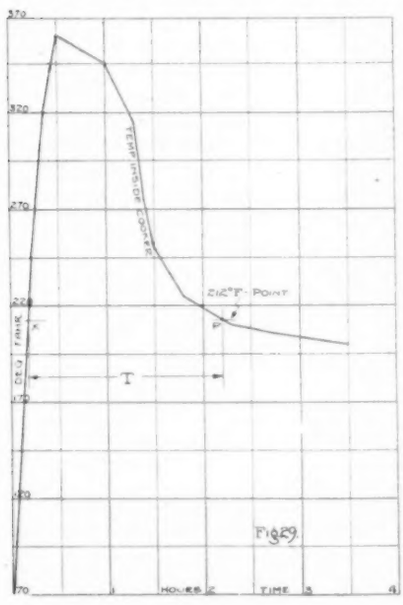

Fig. 29

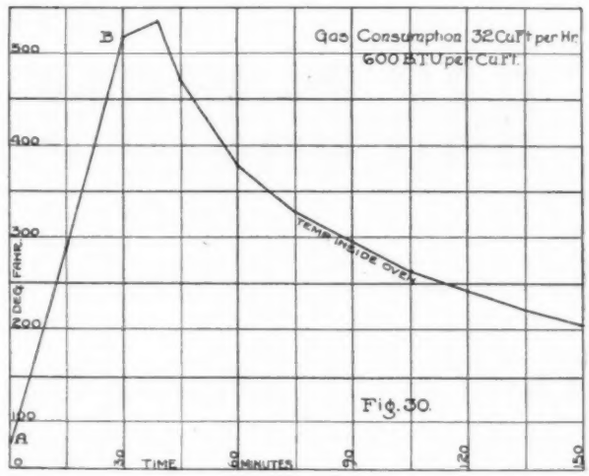

Fig. 30

calculations might be, they still serve to illustrate the contention that but a very small amount of thermal energy is utilized in the process of cooking.

It would seem, then, that, insofar as the fireless cooker and the fireless cooker gas range are concerned, the cooking operation is in the nature of boiling, in one form or another. Hence, there will be little or no cooking accomplished once the temperature of the food containers or ovens drops below 212 deg. Fahr. This at once gives us a basis for contriving a reliable scheme which can be used in rating such an appliance in a mathematical sense.

Testing the Ordinary Fireless Cooker

It will be generally recognized that the use of food in testing appliances, even though it is the medium used in actual practice, is not entirely satisfactory, and one is forced to the alternative of employing water. Let us see, then, how this can be used to serve our purpose in the case of fireless cookers.

Assume (see Fig. 29) that a certain fireless cooker was employed in preparing a meal and that, after the stones were heated up and, together with the food, placed in the cooking space, a thermometer was so introduced that readings of temperature could be taken at regular intervals. Now, as shown by the curve, the inside of the cooker will become constantly warmer and in a relatively short space of time will reach a maximum temperature. Then will come a short period of slow falling off in temperature, followed by another short interval of a rapid diminution of temperature, and still later a long period of comparatively slow decline. It is evident that by far the greater portion of the cooking has been done in the interval T between points X and P, which are each at the 212 deg. Fahr. level. Stated in a different manner, that portion of the initial thermal energy in the heated stones given up between time X and time P minus the amount of heat radiated from the sides of the cooker must be the heat that has been usefully employed in accomplishing the cooking. Hence, if we could substitute for the food in the cooker some medium to be heated whose thermal and physical mathematics could be readily handled, and which could be subjected to a heat treatment similar to that employed on the food, we could work out a close approximation of the efficiency of the cooker. It is

therefore suggested that water be used and in the following manner: After devising a thin wall copper or brass coil similar to the coil in some water coolers, the same should be introduced into the cooker directly after the heated stones or radiators have been placed therein. This naturally necessitates that some provision be made in the side or top of the cooker for allowing the two ends of the coil to extend through to the outside. Next, one end of coil should be connected to a feed water line and the other end should feed into some convenient receptacle in which the water passed can be weighed. There should be a thermometer at the point where the coil enters the cooker, as well as another located at the point of exit. Water is then passed through the coil at such a varying rate that a third thermometer protruding into the cooker proper shows a temperature variation closely approximating that obtained when there is actually food being cooked. For example, let us assume some data, same being based on the assumed curve shown in Fig. 29.

Time	Inlet Water Temp. (Deg. F.)	Outlet Water Temp. (Deg. F.)	Temp. Inside Cooker (Deg. F.)	Water Passed
0 min.	70	84	212	..
10 min.	70	83	290	..
20 min.	70	81	362	..
30 min.	70	78	360	..
40 min.	69	75	358	..
50 min.	68	73	345	..
1 hr 0 min.	71	74	322	..
1 hr. 10 min.	70	75	275	..
1 hr. 20 min.	68	78	248	..
1 hr. 30 min.	68	82	238	..
1 hr. 40 min.	69	83	221	..
1 hr. 50 min.	70	85	217	..
2 hr. 0 min.	70	86	212	40 lb.

Average inlet water temp., 69.5 deg. Fahr.
Average outlet water temp., 79.8 deg. Fahr.
Rise in temperature, 10.3 deg. Fahr.
Water passed, 40 lb.
B.t.u. imparted to water, 412.

The 412 B.t.u. then would probably closely represent the useful heat imparted to the food, once its temperature is brought to 212 deg. Fahr. When following this testing scheme it is recommended that the coil have only three or four turns at the most, and that the diameter of a turn be about from one-half to two-thirds of the inside of the diameter of the cooker. The rate of flow of the water through the coil, which in turn governs the rate of change of temperature in the cooker, can, it is thought, be varied fairly easily by means of a needle valve on the outlet of the coil.

Strictly speaking, that portion of the curve between zero time and X also represents in a measure a small amount of efficient work done on the food.

The writers, of course, recognize that the scheme suggested above is somewhat out of the ordinary and rather tedious, but for giving a close approximation they feel that it is superior to the method of cooking certain kinds of food and drawing conclusions therefrom.

One item for consideration on the strength of the above discussion is worth looking into. It might be argued that different kinds of food will have different capacities for absorbing heat, and will therefore show cooling off curves for the interior of the cooker with quite different characteristics. As a matter of fact, except for the two extremes of cooking very dry and very wet foods, the amount of difference will be negligible, except, of course, insofar as quantity is concerned.

A second test that can be run, and which has a fair degree of accuracy, consists in placing the heated stones in the cooker and, with absence of food, to note the falling off in temperature by means of a thermometer, after which a cooling curve can be plotted. Then the curves for different cookers of relatively the same dimensions and capacities can be compared and conclusions drawn concerning their comparative merits.

It is also considered a good plan to examine and conduct some minor tests on the stones or radiators. These, generally being of soapstone or talc, will have specific heats varying not widely from the figure 0.20, and therefore the heat content in B.t.u. at a given temperature will not be very different for different kinds of stone. Hence, no test in this direction is considered necessary. However, stones having essentially the same heat capacity might have widely different properties along other lines. For example, the physical structure might be such as to cause breakage to occur when only a slight shock is given to the stone. Also, some stones might show decided inability to withstand comparatively sudden changes in temperature without chipping and splitting badly. One method for testing out this latter feature is to heat the stones up to 600 or 700 deg. Fahr., say, and then to immediately turn an electric fan on the same in order to get a quick cooling; or, if tested in winter, the stones may be placed in the outside atmosphere. This procedure can be repeated twenty-five or fifty times and any bad features noted. The temperature should be taken by means of a flat bulb thermometer. Sometimes a close inspection of the stones will disclose strata along which failure might be anticipated. If one cares to, the ability of the stones to withstand shock can be tried out by dropping a metal sphere, such as a large ball-bearing or other similar object, from various heights onto the stone, which is held in a flat position.

Testing the Fireless Cooker Gas Range

Considerable strides have been made in late years by appliance manufacturers along the line of applying the fireless cooker principle to the ordinary gas range. In this case, instead of heating up one or more stones on the gas range and placing them in an insulated compartment containing the food to be cooked, the ordinary baking oven is heavily insulated and heat from the ordinary oven burners is directly applied in heating this space up to the desired point, whereupon the gas supply is shut off and the stored-up thermal energy is utilized in performing the cooking.

To digress slightly from the subject, the writers do not believe that this style of fireless cooker is much, if any, superior to the old-fashion variety of fireless cooker, and it would seem that more material, such as soapstone, should be incorporated in the design of the fireless cooker gas range.

For example, assuming the specific heat of the iron used in the construction of the oven to be 0.12 and that of soapstone to be 0.22, and also that there are 30 lb.

of iron surrounding the oven, we could figure as follows:

Say 20 lb. of soapstone could be used as the bottom of the oven; then we would have a combination of 25 lb. of iron and 20 lb. of soapstone. Whereas, in the original condition, the oven would have 30 lb. of iron only.

Now, if the oven were heated up to 670 from 70 deg. Fahr., we would have stored up in each case the following heat units:

First case—

30 lb. iron × 0.12 × 600.... = 2160 B.t.u.

Second case—

25 lb. iron × 0.12 × 600.... = 1800 B.t.u.
20 lb. soapstone × 0.22 × 600 = 2640 B.t.u.

Total ..... = 4440 B.t.u.

In other words, an increase of 2280 B.t.u.; and, incidentally, the B.t.u.'s rather than degree of temperature are what do the cooking.

We might now examine a typical curve made up from actual data recorded during the cooking of an average meal for four persons in the baking oven of a fireless cooker gas range (see Fig. 30).

The rise in temperature from A to B took place during the time the gas was being burned, or for thirty minutes It will be noted that after the gas was turned off the temperature inside the oven continued to rise for about nine minutes, due to the fact that the walls of the oven were giving up some of their heat to the interior of the oven as well as radiating the balance to the outside atmosphere. This state of affairs, of course, persisted until a state of thermal equilibrium was established.

We may reasonably assume that the food (in the oven from the time the gas was ignited) started cooking after about nine minutes (212 deg. Fahr.) and continued to cook until about two and one-half hours had elapsed. Incidentally, if a fairly liberal portion of soapstone had been used in the make-up of this range the gas could have been shut off sooner; the maximum temperature would have been somewhat lower than that shown in Fig. 30, but the cooling curve at the end of, say, two and one-half hours would have been materially higher.

The curve shown was obtained by means of a long-stem thermometer which protruded through a hole (tight fitting) in the top of the oven, and had its bulb at or about the center of the same.

It is recommended that such curves be worked out on similar appliances during the testing procedure; for since all have ovens of nearly the same dimensions, fairly accurate comparisons can be made and conclusions drawn therefrom. The derivation of these curves need not necessarily be made with food in the oven; indeed, it is considerd more accurate to carry on this phase of the testing with the oven empty.

As suggested in the case of the ordinary fireless cooker, where one is desirous of approaching accuracy and at the same time carrying on some original investigation, a coil through which water is passed can be employed. The style of coil to be employed can be similar to that used in testing the oven of an ordinary gas range, and for details the reader is referred to Part V of this series appearing in the Jan. 26, 1918, issue of the AMERICAN GAS ENGINEERING JOURNAL.

In addition to the aforementioned tests, the physical features of the range as regards durability, etc., should be passed upon. Particularly should the proposition as to whether the inside lining will rust readily be looked into, since this type of appliance has to contend with much more condensation than is the case with the ordinary gas range.

THE GAS TOASTER AND OTHER SMALL APPLIANCES

PRELIMINARY REMARKS

The self-contained gas-fired bread toaster for use on the table is one of the latest additions to the many desirable gas-consuming devices already in use. In shape and general construction it resembles quite closely those using the electric current as the heating medium. As a rule, the gas toaster has a number of vertical wires which act as the radiating medium, and in this case we can say that the heating wires on the electric toaster are internally heated, whereas those on the gas are externally heated. One point of substantial difference is that in the case of the electric device the bread to be toasted is relatively close to the wires in question, while in the case of the gas toaster the bread is much farther removed from the wires.

The operation of toasting consists essentially in rapidly oxidizing the surface of the bread and at the same time reducing its moisture content by evaporation. This effect, as we very well know, is best gotten by the action of a comparatively intense radiant heat rather than by exposing the surface of the bread to the direct action of the flame. Hence, we might say that the relative merits of a particular gas toaster depend upon the ability with which the burning gas heats up the radiating wires and the efficiency with which the heated wires give off this stored-up thermal energy as radiant heat. As a matter of fact and interest, there is much room for an easy improvement insofar as the efficiency of a gas toaster is concerned.

TESTING ROUTINE

We can appreciate that it would be a very difficult thing to say when one piece of bread has been toasted to the same degree as another piece, for this is not entirely based on the degree of brownness. This statement is, of course, made with the thought in mind that we are speaking in a strictly quantitative sense. Hence, except for where only approximate testing is sought—that is, where we are not particularly interested whether a toaster consumes 3 cu. ft. or 2½ cu. ft. of gas in doing a certain piece of work—the method of testing by means of bread exclusively is not advisable. As a substitute, the use of water in the following manner is suggested:

Construct a shallow copper chamber 2¾ in. long by 2¾ in. wide by ½ in. thick; or, in other words, about the size of the ordinary slice of bread. It should be preferably made of rather thin gauge metal so that the transfer of heat can be accomplished with the desired rapidity. A place for an inlet thermometer is provided and one for an outlet thermometer.

This device is connected up to a water line and provision is made for collecting and weighing the water passed. The procedure then consists in lighting and adjusting the toaster and at a given time placing the copper chamber in relatively the same position on the toaster as a slice of bread would be. Briefly, then, water is passed through the chamber and weighed, after noting the inlet and outlet water temperatures, as well as

the gas consumption. The subsequent calculations are then a simple proposition.

This operation should be carried out in two stages—first, with the chamber in a polished condition, and, second, with the same having a deposit of lampblack on the side nearest or next the source of heat. In this manner the radiant heat can be closely arrived at by taking the difference between the results derived for the two cases.

The Percolator and Chafing Dish

To all intents and purposes both the gas-fired coffee percolator and the chafing dish might be compared in their action with the top burner of a gas range over which a certain shaped vessel or utensil has been permanently fixed. This statement is borne out by the fact that the kind of cooking or what not done in each is exactly similar. In the case of the percolator, thermal work of a boiling nature is done wherein the vaporized liquid is continually being condensed and again re-vaporized. The chafing dish cooks most of its food through the medium of boiling; hence, the testing of at least the chafing dish at once resolves itself into a more or less easy proposition, and it is suggested that the procedure be as follows:

First, a definite weighed quantity of water should be placed in the cooking vessel, the gas lighted and the water brought to a boil. Then the boiling should be kept up for a definite length of time, or until a quite appreciable quantity of the water has been evaporated. At this point the water should be quickly transferred to another receptacle convenient for weighing on scales. During the test a record is, of course, kept of the gas consumption and other data. The subsequent calculations are quite simple and need no explanation.

An accurate method for testing the percolator is, indeed, a difficult thing to devise, for the following reasons: As explained above, during the operation of the percolator we have a cyclic effect whereby the water is evaporated and immediately condensed with little or no diminution of the original amount; that is, but little steam escapes to the atmosphere. In other words, the phenomenon is quite similar to a steam plant with the exhaust returned to the boiler. Now it will be recognized that it would be a quite difficult thing to determine the rate of evaporation, since in order to do so one would also have to be able to measure by some means the amount of condensation forming in a given time. As a crude makeshift, then, the following methods are suggested:

First—A given quantity of salt should be put into the ground coffee container and the water allowed to percolate through the same for a definite time. Then, by testing the strength of the salt solution, a rough comparison can be made.

Second—The time required to bring a certain quantity of water to a boil can be used for arriving at a rating.

Third—The top of the percolator can be removed and the test conducted as in the case of the chafing dish.

Particular attention should be paid to the construction and operation of the gas burner on both the percolator and chafing dish, for, unfortunately, most manufacturers of these appliances seem to concentrate on the artistic appearance of each, and as a consequence the most important feature is neglected. One will generally find that, as a rule, the orifice is a fixed one which is very objectionable. Then, too, the mixer and burner are oftentimes poorly designed and liable to give trouble in service.

No Business Man Reckons Money Paid for Publicity an Expense

Sir Hallewell Rogers Points Out Need of British Gas Companies Increasing Advertising Appropriations—Does Not Exclude Municipal Undertakings

The communal and national aspects of the extended use of gaseous fuel—the abolition or diminution of the smoke nuisance and the consequent increased sunshine and improved atmosphere in our cities; the saving of labor, alike in factory and in home; the better conservation of our dwindling coal resources—appeal more particularly to those of us responsible for gas supply in great industrial centres, but must necessarily interest every citizen of the Empire, declared Sir Hallewell Rogers, in his address upon retirement as president of the British Commercial Gas Association. And for this, if for no other reason, everyone administering a gas undertaking with a statutory monopoly of supply should feel he is under an honorable, if not a statutory, obligation to do everything possible to increase the use of gas in his area. He should also not forget that success in such efforts means, through increased turnover, reduced prices to the consumer, and possibly (though not desirably) larger contributions to the rates. But no one can fully develop the sale of anything, however useful and satisfactory, except by making known its merits and advantages; and this can only be done by means of skillful and persistent publicity.

Cost of a Postage Stamp Per Customer

Every successful business spends large sums of money on advertising and other forms of publicity—far larger sums in proportion to turnover than the gas industry has yet dreamt of spending, or at least than the great majority of gas directors and committee men have dreamt of spending. [I should not like to answer for the Executive Chairman's dreams in this direction.] The sum of 2s. 6d. per million represents one penny—not the present price of one postage stamp—per actual known customer per annum! How would this compare with the expenditure of any leading drapery store, or motor-car business, or soap or chocolate manufacturer? The gas industry has in the past thought on very small lines in this vital matter of publicity—mainly, perhaps, because those who have to provide the money are too prone to regard it as an "expense." No business man reckons money paid for publicity as an expense, but rather as an investment—money which, if it is wisely laid out, comes back over and over again in larger turnover and disproportionately increased profits.

Even the Government has found out the enormous value of publicity during the war. Think of the Recruiting Campaign, the Food Economy Campaign, the War Savings Campaign, and then recollect that before the war the Government never advertised on business lines. Well, some of us in the gas industry want to take a lesson here even from the Government, and wake up to the productive character of publicity. Then I am sure that the Association's ambition of 2s. 6d.

per million from 100 per cent of the industry will before long be more than attained, as we shall have undertakings volunteering a higher rate of subscription in order to get—as they would get—a still higher rate of return. Municipal undertakings ought to subscribe as freely as company undertakings—indeed, all the largest of the municipal undertakings do subscribe more freely than some of the larger company undertakings, I am surprised to find—because it is just as much their duty to expand their business, and cheapen their product, as if they were in business for private profit.

No municipality ought to be satisfied until its publicity methods, like its show-rooms, its exhibitions—all its commercial arrangements—are as effective and as efficient as those of any company. And this should include businesslike, informed, courteous service on the part of every one of its employees, from the fitter's boy up to the general manager; for without good service to follow sales the best advertising campaign in the world will not secure permanent profitable results. This is a point which the "B. C. G. A." in its "Bulletin," and by every means in its power, constantly emphasizes, and on which it proposes to do more to develop and render service to the industry when the war is over; and I strongly commend this aspect of its policy, and its propaganda within the industry, to the favorable consideration of all gas administrators.

If we as an industry are to make the progress we could, and should, make in the strenuous times before us, we must modernize our methods throughout, not merely within the works, but on our districts, in our show-rooms, in our offices, and, not least, in our board rooms. We must think commercially, not "officially"—in terms of efficiency, not of complacency. Our staffs must be live representatives of live concerns; not dignified officials of dead departments. It is because I believe the "B. C. G. A." to be capable of assisting the gas industry to attain a far higher level of efficient public service on sound commercial principles, and of carrying on highly profitable publicity work for the industry on very broad farseeing lines of policy, as well as on those making for immediate results, that I am glad to have been its President, and in laying down the office commend its work to the whole-hearted support of the industry throughout the country.

Zoning System Saving Millions

Estimates made earlier in the fuel year that approximately 160,000,000 car-miles would be saved in the coal year through the operation of the zone system for the distribution of bituminous coal are being fully realized, it was announced to-day by the United States Fuel Administration.

This system, made possible through the close cooperation of the United States Railroad Administration with the Fuel Administration, has had a large share in bringing the nation's supply of bituminous coal to its present proportions, which, with patriotic economy, will be sufficient for the winter's requirements.

This method of distribution was established so that the coal supply of all sections of the country should normally be derived from mines relatively near, thus preventing abnormal and wasteful transportation movements, and insuring more equal distribution of cars to the mines and the more steady employment of mine labor.

Early estimates were that the movement of bituminous coal affected by the war zone system would involve about 300,000,000 tons, or 60 per cent of the total production. The latest figures show that 368,858,000 net tons of this kind of coal have been produced and delivered since April 1, 60 per cent of which is affected by the zone system.

These later figures show that even more than the originally estimated 160,000,000 car-miles will be saved in round-trips to and from the mines and that considerably more than the 300,000 additional trips, which the saving in car-miles would effect, will be made. Exact figures have not been compiled, but the early estimate allowed for the 300,000 additional trips being the equivalent of 5 per cent increase in the production.

How the Gas Companies Are Helping the Nation

The Laclede Gas Light Company of St. Louis which has sent several hundred boys "over there" and which gave the services of its men from President Holman down to the clerks to the Liberty Loan Organization during the last campaign, has again shown its unstinting patriotism by donating to the government the services of J. J. Burns, superintendent of the commercial department. Mr. Burns has been appointed manager of the Second Patriotic Food Show which is to be held at the Coliseum of St. Louis November 25 to December 1, under the direct supervision of the Food Administration. Mr. Burns was manager of the First Patriotic Food Show a year ago. He made such a success of the affair in spite of the fact that the street car men of the local railways walked out on strike the opening night of the show that the Food Administration again asked him to manage the show this year.

Former Employee of Gardner Company Killed in Action

Hiram H. Hillman, formerly an employee of Gardner Gas, Fuel & Light Company of Gardner, Mass, was killed in action in France Aug. 11, according to information received at the office of the company recently. Mr. Hillman went from Gardner to Brooklyn where he enlisted in the submarine service. Owing to injuries received at a submarine base he was later transferred to E Company, 108th United States engineers and sent to San Antonio. After remaining in Texas a few months he was ordered overseas and had been in France for nearly a year when he met his death.

Armin A. Schlesinger, 902 Marietta Avenue, an officer of the Milwaukee Solvay Coke & Gas Company, Milwaukee, Wis., was appointed captain in the chemical war service, according to word received recently. Mr. Schlesinger has been in Washington for some time, where he has been engaged in supervising the manufacture of chemicals for war purposes.

Nitric Acid as a By-Product of Internal Combustion Engines

While in Ordinary Times the Gas Engine By-Product Process Is Not Most Economical, In Times of Stress When Speed Is More Essential Than Economy and Where Natural Gas Is Available It Can Compete With Any Other Process

By A. W. H. GRIEPE, M.E.

The following is a description of processes to precipitate nitric oxide (NO), a by-product of internal combustion engines, flue gases, illuminating gas, furnace gas, blast-furnace gas, natural gas, etc.

Previous experiments of Nernst, Haeuser, Muthmann, Hofer, von Bauer, Koehler and Lunge were made use of to make this process a commercial possibility.

The following chemicals are involved:

NO = nitric oxide
N_2O = nitrous oxide
NO_2 = nitric dioxide
N_2O_4 = nitric tetraoxide
N_2O_3 = nitric acidoxide
NO_5 = nitric pentoxide
HNO_3 = nitric acid
NH_4NO_3 = ammonia nitrate
HN_4NO_2 = ammonia nitrite
HNO_2 = nitrous acid

Nitrogen will combine very rarely with other elements, especially with oxygen, but when both elements come in contact at high temperature the following reaction is taking place:

$$N_2 + O_2 = 2\ NO \qquad \ldots\ldots (I)$$

and nitric oxide is formed, which absorbs very readily oxygen at low temperature and thus forming nitrous dioxide—NO_2.

$$2\ NO + O_2 = 2\ NO_2 \qquad \ldots\ldots (II)$$

This compound, a yellowish-brown poisonous gas, again by absorbing oxygen from the air, dissolves in water to nitric acid—

$$2\ NO_2 + O + H_2O = 2\ HNO_3 \ldots\ldots (III)$$

The reaction (II) of nitrous dioxide is automatic, while reaction (III) offers no difficulties as long as the water surface is large and the water is added in form of sprays to admit air freely.

This shows that the manufacture of nitric acid with the raw material of air and water, which are everywhere in abundance, can be made commercially feasible, if nitric oxide can be produced reasonably cheap. The process shown here demonstrates that this can be done in many different ways without resorting to the electric arc process as invented in the eighteenth century by Cavendish and later developed by Witt, Birkeland-Eyde, Schoenherr-Hessberger, Pauling-Moscicki, or the cyanomide process of Siemens-Rothe-Freudenberg, or the aluminum-nitrate process of Serpeck, or the ammonia-hydrogen-nitrogen process of Haber and Le Rossignol-Ostwald. This new process can compare favorably at the present time and conditions with the above-mentioned processes in regard to cost of manufacturing, especially as the very expensive electric plant can be avoided, and HNO_3 gained as a by-product. F nitrogen and oxygen at high temperature, which form two atoms of nitric oxide.

$$N_2 + O_2 + \text{high temperature} = 2\ NO$$

but nitric oxide will decompose into nitrogen and oxygen at a low temperature.

$$2\ NO + \text{low temperature} = N_2 + O_2$$

The velocity—V—at which the above formation takes place at high temperature is:

$$V = K\,(O).(N)$$

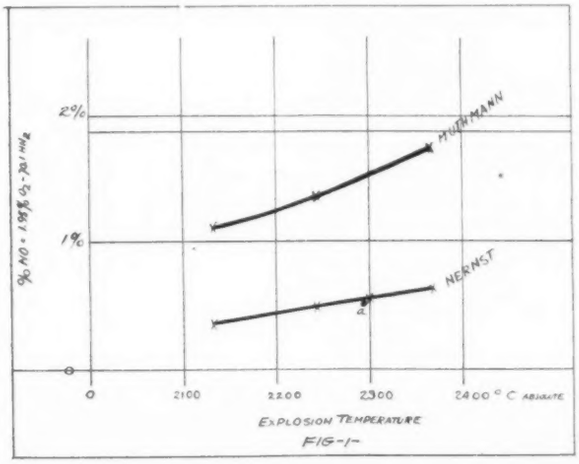

FIG-1-

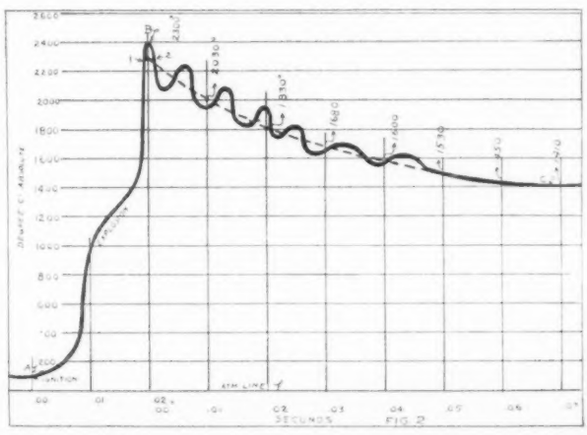

FIG 2

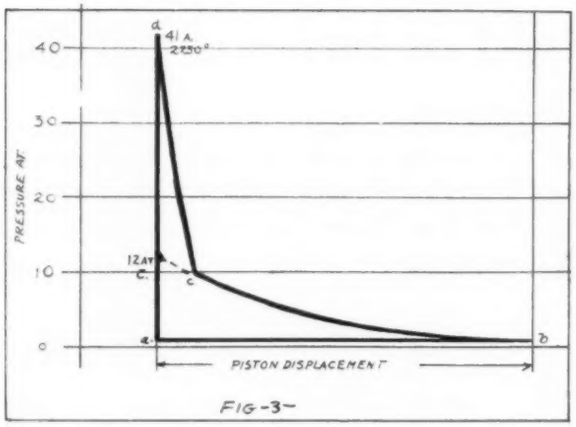

FIG-3-

N and O in per cent of volume.

The velocity—V^1—at low temperature is:

$$V^1 = K^1 (NO) . (NO)$$

The dynamic equation therefore is:

$$V = V^1$$

Then, $$\frac{NO^2}{(O) . (N)} = \frac{K}{K} = K^\circ \qquad \ldots\ldots (IV)$$

This equation represents the chemical quantity effect; and if K° is known, then, according to (IV), the amount of NO can be ascertained. The constant K° depends entirely on the temperature—that is, the higher the temperature the higher the value of K°, and therefore the output of NO. The time equivalent also depends on the temperature—the higher the temperature the less time is consumed.

These are the general conditions for the production of nitrous oxide. The new proposed process operates as follows:

Process I (Figs. 3 and 4).—An explosive mixture of gas and air is compressed and ignited; the explosive mixture decomposes into NO at 2250 deg. Cent. and 40 atm. pressure. At this period water is injected to cool the gases quickly, thus forming nitrous dioxide and nitric acid.

Process II (Figs. 5 and 6).—In a four-cycle gas engine, instead of letting the gases expand gradually, at the highest pressure and highest temperature (2250 deg. Cent.—41 atm.) water is injected, reducing the temperature to 1800 deg. Cent. and 33 atm. pressure, thus absorbing NO; the gases escape through the exhaust valve into a receiver, forming nitric acid.

Process III (Figs. 7 and 8).—A compressor of large capacity compressing flue gases, air and a small amount of hydrocarbon to 12 atm.; then exploding this mixture. Otherwise same operations as Process I. (For properties of flue gases see Table 7.)

The above processes will give the following results: As mentioned under (IV), the constant K° depends entirely on the temperature, and, according to the heat theory of chemical decomposition by Vanthoff, it can be stated as follows:

$$\frac{d \ln K^\circ}{d T} = \frac{Q}{RT^2} \qquad \ldots\ldots (V$$

in which

Q = Heat calories for the production of 2 gr. NO
R = Gas constant in heat calories for 1 gr.

Is K° known in relation to a temperature—T—, then the integral constant can be ascertained and equation (V) is changed as follows:

$$\log K^\circ + \frac{C}{T} = C^1 \qquad \ldots\ldots (VI)$$

Therefore, K° can be determined from (VI) for each degree temperature and (IV) will give the output of NO.

The value of K°, according to Muthmann and Hofer, is about 1.65 per cent NO:

$$K^\circ = \frac{1}{119} \text{ at 1800 deg. Cent.}$$

and according to Nernst, .99 per cent NO:

$$K^\circ = 6.1 \times 10^{-4} \text{ at 2200 deg. Cent.}$$

The value of K° of Nernst is considerably less than the value of K° of Muthmann and Hofer.

Fig. 1 shows the difference of the two values, in which the abscisses represent the explosion temperature from 2130 deg. to 2370 deg. Cent. and the ordinates show the output of NO in volume, percentage of exhaust gases containing 1.95 per cent oxygen and 70.1 nitrogen.

The time equivalents as shown on diagram Fig. 2 have been obtained by experiments. At A the mixture is ignited; pressure and temperature rises rapidly, so that after 0.02 second the explosion is completed and the expansion and cooling process starts; pressure and temperature decrease according to the curve BC. The highest temperature of 2300 deg. Cent. was constant for about 0.002 second. (See points 1 and 2.)

During this period a quantity of NO has been formed, shown at diagram No. 1, at point A of the Nernst curve, showing that the latter gives a very close value of K° of the actual quantity obtained. The drop in temperature is very rapid at the start; the temperatures are shown for time intervals of 0.01

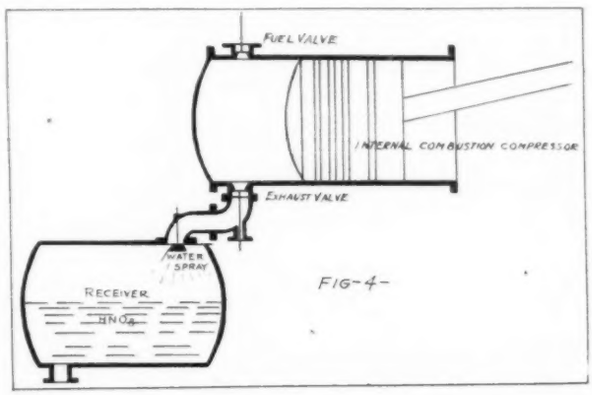

FIG-4-

second. The drop in temperature after 1800 deg. Cent. is very gradual, the explanation for the phenomenon being that after 1800 deg. Cent. the velocity of the decomposition of NO into N_2 and O_2 is comparatively very slow.

This phenomenon forms the nucleus of the new process, as it is apparent that the gases have to be cooled down only to 1800 deg. Cent., while the remaining pressure and temperature are still available for useful work in internal combustion engines. The operations of the various processes are as follows:

Process I (Figs. 3 and 4).—An internal combustion compressor admits a fuel (gas) and an abundant supply of air at atmospheric pressure (see A-B, Fig. 3); the mixture is compressed, B-C; then ignition takes place at approximately 93 per cent of the completed stroke, C; the pressure and temperature rises to D (see C-D); at this point the nitrogen of the air and the oxygen combine to nitrous oxide; the gases are not allowed to expand, as in internal combustion engines, gradually reducing in temperature and pressure, but the hot gases are released instantly through

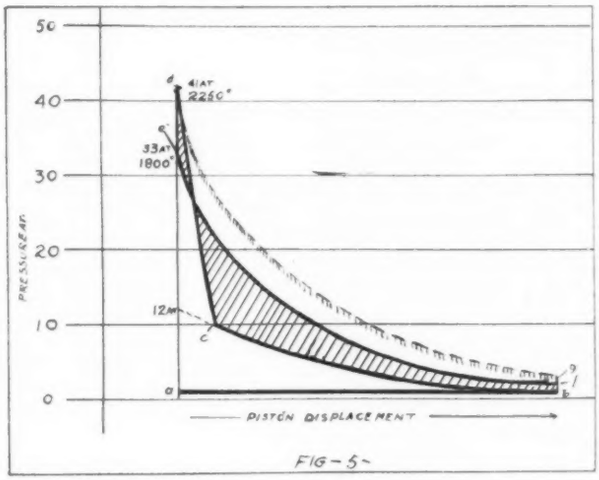

FIG-5-

an exhaust valve into a receiver, where they are cooled instantly by a water spray, forming NO_2 (see II) and later nitric acid (see III). Now, to determine the commercial feasibility of the process, a quantity analysis will show the results.

Assumptions:

The internal combustion compressor uses blast-furnace gas of—

35 per cent CO and 65 per cent N_2 960 HC.
Mixture: 48 per cent gas, 52 per cent air.
Compression pressure about 12 atm.
Explosion pressure about 41 atm.
Temperature (Mallard, Le Chatelier), 2250 deg. Cent.
K° (Muthmann), 1.65 per cent NO.
One cbm. mixture: 18 gr. NO or 38 gr. HNO_3.
Power necessary, 0.078 HP H.
Heat expenditure, 461 H.C.
One HP H, 1 cent.
Gas 1000 HC, .0625 cent.
Cost of production of 1 kg. HNO_3, 2.75 cents.

The above process has the advantage of obtaining a purer nitric acid which can command a higher

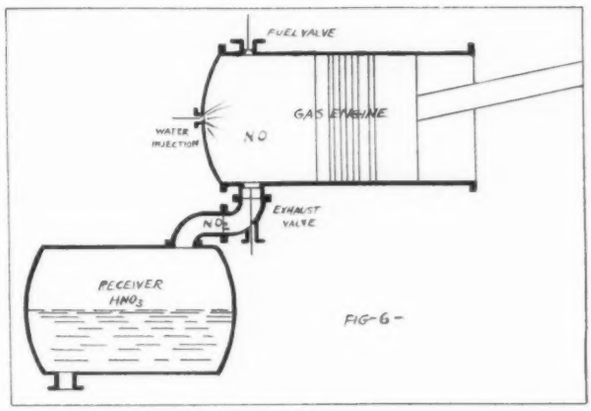

FIG-6-

price. If the constant K° of Nernst is used the cost will increase. Cost of production—Nernst:

1 kg. HNO_3 = 11 cents

Process II (Figs. 5 and 6).—An internal combustion engine of the four-cycle type admits at atmospheric pressure a gas mixture (See A-B, Fig. 5), compressing the mixture adiabatic b, c. At c mixture is ignited; explodes c, d; end of explosion at d. At this point cold water is injected into the cylinder (see Fig. 6), cooling the gases from 2250 deg. Cent. to 1800 deg. Cent. (see d, e). Then the gases are admitted to expand from e to f, and finally exhaust into the receiver, where the nitric dioxide NO_2 formed at d, e is absorbed by the water contained in the receiver, forming HNO_3. It may be noted that no HNO_3 is formed in the cylinder.

Cost of manufacturing, assuming the same conditions as under Process I:

Blast furnace gas—
35 per cent CO, 65 per cent N_2, 960 HC.
Mixture: 48 per cent gas, 52 per cent air.
Compression pressure about 12 atm.
Explosion pressure about 41 atm.
Temperature, 2250 deg. Cent. absolute.
K° (Nernst), 99 per cent NO.

One cbm. gas mixture produces 9 gr. HNO_3—Nernst K°.

The expansion curve e, f, with the starting point at 33 atm., is drawn with exponent of 1.41, disregarding the effect of the water injection. The loss in the

(*Continued on page* 492)

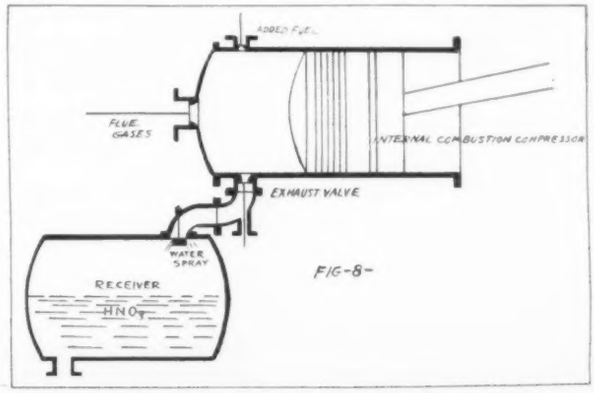

FIG-8-

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That New Construction Boom

It seems that somewhat unwittingly we have stepped on the toes of our Chicago contemporary, and have vexed him.

We expressed as our view that of the present—some weeks ago was not the time to say whether or not there would be any radical expansion of gas plant capacities.

On the face of it the likelihood would appear that there will not, cannot, be any great expansion. It is a disagreeable condition of life that we cannot invariably do the thing we would like to do and that really should be done.

Greater gas plants may be exceedingly desirable, but greater gas plants require the expenditure of money. Did our Chicago contemporary consider this important element when he set forth on his crusade for immediate extension of gas plant capacities on an ambitious scale? Did he seek and find the answer to the question of where the money is to come from?

Is he not aware that certain gas companies have had unoffered securities locked up in their treasuries for years awaiting a market that would take them? Has he reason to believe that that market is now existent with the greatest National Loan in our history so short a time behind us and others still ahead?

Assuming then that our Chicago contemporary has familiarized himself with these pertinent matters can it be possible that he is unaware that a number of our gas companies have sustained losses in these past few tense years? Is it not conceivable that before attempting any expansions they will require a considerable proportion of the sums realized from the sale of their securities, when there is a market, to make good these losses?

Also, going beyond the gas companies, has our contemporary inquired as to the ability of the constructors to undertake extensive expansion of gas plants at the present time? Our information is to the effect that, while the constructors are prepared to handle a normal increase in volume of business, they would be considerably set back, and unable to promise delivery, were they to suddenly be faced with an unforeseen and unprecedented call for bids for new construction on a generally ambitious scale. It must be remembered that our gas plant constructors have not been niggardly in placing their facilities at the disposal of the Government at war. The war now is, of course, over, but not sufficiently long ago to have enabled the gas plant constructors to have made the extensive readjustments necessary to get back to their normal pursuits.

Our Chicago contemporary, we fear, has been somewhat hasty and superficial in arriving at his conclusion. He is a youngster in the point of years of existence and inclined to be impetuous. Naturally the

conservatism of a gray beard like the JOURNAL must annoy him. But conservatism is not always an undesirable quality. Ultra conservatism has in some cases held back the development of the gas industry, but the kind of conservatism that inquires first and declares later instead of vice-versa is in no small measure responsible for the fact that the gas industry is in sound condition to-day after the most severe test in its history.

The Importance of Gas as a Fuel for Industrial Purposes

During the past two years a large number of gas installations for industrial work have been described in the JOURNAL and they have provided the industry with practical information tending towards the complete development of their industrial fuel branches.

In no period of the gas industry has the attention of engineers been concentrated to such an extent on the production of burners for the use of gas as a fuel for every branch of industry as has been the case during the last two years. At the present time there is a gas burning apparatus which will fit the needs of almost every industrial purpose where fuel of any kind is required.

Plants where this kind of apparatus has been installed have found it not only economical and cleanly, but accomplishing the purpose in many cases better than any other fuel. No journal has previously made an apparent effort to provide information of this kind.

The response upon the part of industrial men has been gratifying in the extreme. We did not have to prove to them that there was a dearth of practical industrial fuel gas literature. They had experienced it, and had been held back and hampered in their work as a consequence. What we did point out to them was that each, individually, was more or less responsible for the condition, and that no publication, however willing, could effect a change unless it had their active co operation, this co-operation, in brief, being a willingness on their part to bring to our attention any new or unique installations they should make from time to time and to describe them in our columns for the benefit of other industrial men.

It would be impossible to give the number of new uses for gas or the wealth of suggestions revealed in the industrial fuel articles contributed to the JOURNAL by those who are actually engaged in the development of this branch. It is sufficient to say that, if properly assimilated, the information provided must have gone far towards making possible a greater future for the gas industry.

In the stress of our effort to fill an acutely-felt need of the gas industry, we lost sight of the fact that in the industries concerned there is just as intense a desire to improve operating methods as there is in the gas industry for new markets for gas. Also, that there are serving these industries journals whose primary purpose is to provide such industries with information tending towards such results, just as it is the purpose of the AMERICAN GAS ENGINEERING JOURNAL to make the gas man's tasks easier for him to perform.

Our oversight has been called to our attention by several requests from journals serving specific industries for permission to republish articles published originally in the AMERICAN GAS ENGINEERING JOURNAL.

We published these articles to reveal to the industrial gas man uses for gas that might be new to him and to provide him with information as to the advantages of gas for specific purposes such as would make it advantageous for the industries concerned to adopt it as a fuel.

The authors of the articles in question have therefore served two purposes. They have provided their fellow gas men with information that will enable them to secure a greater volume of new business than they otherwise would, and they have directly and generally carried the gospel of gas as a fuel into circles where ordinarily it is carried by word of mouth, and, through bringing the facts directly to the attention of the managing heads of those industries, are paving the way to easy sales of gas, by his fellow industrial men and themselves to those industries. Incidentally, it might be added, those in the various industries will place a great deal more credence in what they read in the reputable journals pertaining to their particular field than they will in the statements of the industrial fuel man.

Now that the war is over and the men in the service will gradually resume their places in the gas industry, the industrial fuel department of every gas company, in the opinion of the JOURNAL, will become one of great importance. They are in a position to give competent advice to the prospective users of gas for industrial purposes in the district they serve and can select for them the apparatus which will best meet their individual requirements and will thus add continuous consumers of millions of cubic feet of gas per day.

Oil Production in California

The increase in oil production from California fields during the past year, as shown by reports filed with State Oil and Gas Supervisor R. P. McLaughlin, has come largely from the Montebello field. In fact, practically all other fields have declined in production. The field first reported production in Feb., 1917. Thirty-four wells are now producing a total of 23,903 barrels per day. One year ago six wells were turning out 8,885 barrels of oil daily. Nearly three-fourths of the present production is from wells belonging to the Standard Oil Company, which drilled the first well in the field.

Nitric Acid as a By-Product of Internal Combustion Engines

(*Continued from page* 489)

output of the gas engine is the difference between diagram b, c, d, e, f and diagram b, c, d, g, which is the cost of manufacturing NO. This loss amounts for 1 cbm. gas mixture to 0.054 HP H.

Gas 1000 HC = 0.0625 cent
1 kg. HNO_3 = 1.0000 cent

If HP H assumed to be 1.0 cent, then

1 kg. HNO_3 = 2.2 cents

Process III (Figs. 7 and 8).—Flue gases as per table, Fig. 2, and small addition of oil; cost of production same as Process I, but reducing cost to

K' 1.65 per cent 1 kg. HNO_3 = 1.75 cents
K' 99.00 per cent 1 kg. HNO_3 = 6.00 cents

Comparative cost of production of 1 kg. HNO_3, while the prices shown are approximate only, the relative cost between the different plants is correct.

Niagara Works—	
Electric arc process	2.05 cents
Cyanamide process	1.05 cents
Norway—	
Electric arc process	1.50 cents
Cyanamide process	0.60 cent
Germany—	
Synthetic ammonia Ostwald process	0.30 cent
Gas engine by-product process	1.75 cents

The gas engine by-product process, while not the most economical, can be easily installed, and especially in this time of stress, when speed is more essential than economy, and where natural gas is available the by-product process can compete with any other process.

The Economical Use of Fuel Oil in Railway Locomotives

University of Illinois Bulletin No. 8. Flexible board back, 9x6 in. Obtainable gratis from Engineering Experiment Station, Urbana, Ill.

The saving of a piece of coal the size of an ordinary egg on each scoopful of coal used in locomotives would amount to 1,500,000 tons a year. Even when firing a freight locomotive on a heavy grade, one less scoopful of coal every fifteen minutes, or one less scoopful every three or four miles, would effect a similar saving. A little more personal interest on the part of railway officials and employees will reduce coal consumption even on railroads where the practice is already excellent and where an earnest effort is being expended to save coal. A study of the practice in the use of fuel on the railways, however, discloses many means of effecting even greater economy.

The Engineering Experiment Station of the University of Illinois has issued a circular, the title of which is "The Economical Use of Coal in Railway Locomotives," to present some suggestions concerning ways in which large coal savings may be made. The circular is printed in four colors.

The facts presented in this circular have been compiled by a special committee of the research staff of the Engineering Experiment Station, assisted by an advisory committee consisting of F. W. Pratt, Assistant Superintendent of Motive Power, Chicago & Northwestern Railway Company, Chicago; W. L. Robinson, Fuel Supervisor, Baltimore & Ohio Railroad Company, Baltimore, Md.; A. N. Willsie, Chairman Fuel Committee, Chicago, Burlington & Quincy Railroad Company, Chicago; Timothy Shea, Acting President, Brotherhood of Locomotive Firemen & Enginemen, Cleveland, O.; A. B. Garretson, President, Order of Railway Conductors of America, Cedar Rapids, Ia.; W. S. Stone, Grand Chief, Brotherhood of Locomotive Engineers, Cleveland, O.; O. P. Hood, Chief Mechanical Engineer on Fuel Conservation, U. S. Fuel Administration, Washington, D. C., and C. P. Richards, Dean of the College of Engineering and Director of the Engineering Experiment Station, University of Illinois.

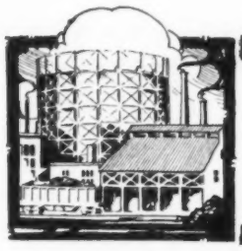
WEIGHT OF FLUE GASES KG PER CBM. 760 mm. M C. = Deg. Cent.

Air	CO_2	O	N	O°	50°	100°	150°	200°	250°	300°	350°	400°	450°	500°	550°	600°
%	%	%	%													
1.5	12.5	7.0	80.5	1.357	1.15	0.995	0.875	0.783	0.709	0.645	0.594	0.599	0.512	0.48	0.45	0.424
1.82	10.0	9.5	80.5	1.3431	1.135	0.985	0.867	0.775	0.7	0.64	0.589	0.544	0.507	0.475	0.445	0.42
2.00	9.0	10.5	80.5	1.338	1.13	0.98	0.864	0.772	0.698	0.637	0.585	0.542	0.505	0.473	0.443	0.418
2.2	8.0	11.5	80.5	1.332	1.127	0.976	0.86	0.769	0.696	0.635	0.583	0.54	0.503	0.471	0.441	0.416
2.5	7.0	12.5	80.5	1.3266	1.12	0.971	0.855	0.765	0.692	0.631	0.58	0.537	0.5	0.469	0.439	0.414

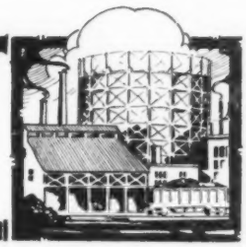
WEIGHT OF FLUE GASES, POUNDS PER CUBIC FO OT. 30 In. M.C. = Deg. Fahr.

Air	CO_2	O	N	O°	122°	212°	302°	397°	482	572	666	756	842°	932	1025	1125°
%	%	%	%													
1.5	12.5	7.0	80.5	0.0845	0.0718	0.0620	0.0545	0.0487	0.0442	0.0402	0.0369	0.0341	0.0325	0.0299	0.0281	0.0270
1 82	10.0	9.5	80.5	0.0835	0.0708	0.0613	0.0540	0.0483	0.0437	0.0399	0.0367	0.0339	0.0316	0.0296	0.0277	0.0268
2 00	9.0	10.5	80.5	0.0832	0.0705	0.0610	0.0538	0.0481	0.0435	0.0397	0.0364	0.0338	0.0315	0.0295	0.0276	0.0266
2.2	8.0	11.5	80.5	0.0830	0.0703	0.0608	0.0535	0.0478	0.0433	0.0395	0.0363	0.0336	0.0313	0.0294	0.0275	0.0265
2.5	7.0	12.5	80.5	0.0825	0.0699	0.0605	0.0533	0.0476	0.0431	0.0393	0.0361	0.0334	0.0310	0.0292	0.0273	0.0264

FIG. 7



NEWS OF THE GAS INDUSTRY



Worcester Company to Petition Commission for Approval of Additional Stock and Bonds

The Worcester Gas Light Company stockholders have voted to authorize the directors to petition the gas and electric light commission for approval of 3,500 shares of preferred stock and an issue of 6 per cent mortgage bonds up to $1,400,000, the proceeds from which will be devoted to paying off floating indebtedness, which amounts to about $1,880,000.

Well Producing 100 Barrels Per Day Brought in on West Virginia Leases

The stockholders of the Power Oil, Gas & Coal Company, a company organized by R. W. Power, of Washington, D. C., has just been advised that he has brought in well No. 1, producing approximately 100 barrels a day.

This is the second successful oil company that Mr. Power has organized in the past two years. Its property consists of leases in Ritchie County, West Virginia. The company has contracts for the immediate drilling of other wells on their property.

Fire in Coal House Threatens Tacoma Plant

The plant of the Tacoma (Wash.) Gas Company at South 23d and A Streets was seriously threatened by fire recently which destroyed a large coal shed and a huge quantity of coal.

The fire was first noticed under the floor of the coal house, situated in the center of the plant. Two of the employees saw smoke and a small blaze under one corner of the floor and endeavored to extinguish it with the company's fire apparatus.

With a slight explosion, the flames broke out all through the building. A fire alarm was sounded and every employee in the plant at the time fought the fire. The flames leaped in all directions and soon had a large ammonia tank hot, but the city firemen worked in a masterful manner and soon had the situation well in hand.

Movement Started to Organize Natural Gas Companies of Ohio and Indiana

Byram C. Robbins, city attorney of Richmond, Indiana, and Nimrod H. Johnson, manager of the Richmond Light, Heat & Power Company, have just begun a movement in eastern Indiana to organize natural gas companies in Ohio and Indiana in an attempt to have the supply of natural gas conserved for the benefit of domestic consumers.

Under the plan of the United States Fuel Administration certain classes of manufacturers were to be cut off from natural gas supply so that domestic consumers might be adequately served, and the plan now proposed is to bring action in Indiana and Ohio and then with the National Fuel Administration in an effort to have the rules as promulgated rigidly enforced. The Indiana public service commission is taking much the same view of conditions, at least in such cases as have come within its jurisdiction.

Fifteen cities are identified already with the movement. Richmond and other cities in Indiana and Ohio, which are served from the West Virginia gas fields, suffered much last winter because of the natural gas shortage due to the excessive drain on the lines caused by the serving of large industrial concerns, whose wartime needs far exceeded those of peace times.

It is pointed out by eastern Indiana gas men that the supply is entirely adequate to meet the needs of domestic consumers in this territory, provided the large industries can be impelled to turn to other fuel during the winter months. These industries, it is now being argued, are in a position now to obtain all the coal they require, since it is a commonly known fact in Indiana now that plenty of coal is in sight for all proposed industrial needs.

Many Phases of Reconstruction Will Be Discussed at Industrial War Service Conference

Many phases of reconstruction will be taken up at the Reconstruction Conference of Industrial War Service Committees called by the Chamber of Commerce of the United States for Dec. 3, 4, 5 and 6 at Atlantic City. The sudden termination of the war has brought reconstruction to the front as the one important problem to-day facing business men. In the congress of business interests at Atlantic City there is offered the opportunity to assume the leadership in dealing with those questions which primarily affect business.

The program for the conference has not been completed but enough of the details have been worked out to indicate the comprehensive way in which this conference will approach the problem of reconstruction. On Dec. 3, the first day of the conference, the 350 war service committees meeting separately will take up questions of special interest to their own industries. At these meetings there will be formulated the policies of the industries represented by the committees and resolutions which individual crafts desire to present during the conference.

For the purpose of facilitating discussion and co-ordinating the ideas of the various industries represented, the war service committees after meeting separately will gather together in thirty-five related groups. Afterwards these related groups will assemble as ten major groups representing the ten primary industries within the United States.

The ten groups as defined for the

purpose of the conference are as follows:

Food Products,
Textiles,
Heat, Light and Power,
Metals and Minerals other than Iron and Steel,
Iron and Steel,
Wood and Wood Products,
Chemicals,
Leather,
Earthen Products,
Industrial Professions.

A list of twenty-five questions has been sent out by the War Service Executive Committee to the members of all war service committees for use as a basis for the deliberations of the individual war service committees at their first meeting. The suggestions offered are not considered exhaustive, and members of the committees have been requested to present other subjects which they think should be discussed.

New Schedule of Rates for Columbia Approved

The Columbia city council adopted unanimously a resolution indorsing a new schedule of rates on gas whereby the larger consumers will have to pay an increased rate in the future.

The resolution was offered by Councilman W. A. Coleman and reads as follows:

"Be it resolved, in consideration of the fact that the Columbia Gas & Light Company has convinced city council that they are now, and have been for the past few months, operating at a loss, said loss becoming larger each month since July, we think they are entitled to an increased revenue, and we, therefore, indorse schedule of proposed new rates; said schedule so arranged as to protect the small and moderate users of gas, and the increase to be placed on the large or commercial users who have at all times enjoyed a much lower rate.

"Be it further resolved that Mayor Blalock call on Governor Manning, requesting his efforts in having the gentlemen here appointed as a public service commission to accept the appointment, but if they will not, then to appoint three others who will serve, and summon them in session at the earliest possible moment for the purpose of hearing this case.

"Be it further resolved that in the event that the public service commission should find that proposed increase in rates is extortionate or unfair at the time of the increase (that is, November, 1918) the city council of Columbia. (S. C.) would want and expect the Columbia Gas Light Company to refund to all users of gas whose rate was increased the difference between the present rates and proposed schedule which we now indorse."

The new schedule of rates follows:

First 1,500 cu. ft. $1.45.
From 1,500 to 2,500 cu. ft., $1.40.
From 2,500 to 5,000 cu. ft., $1.35.
From 5,000 to 7,500 cu. ft., $1.30.
From 7,500 to 25,000 cu. ft., $1.25.
From 25,000 cu. ft. and above, $1.20.

The minimum rate will be $1.00 with a 10 per cent discount, making a net minimum rate of 90 cents.

The present gas rates in Columbia are as follows:

First 400 cu. ft. at $1.55 per 1,000.
500 to 1,500 cu. ft. at $1.45.
1,600 to 2,500 cu. ft. at $1.40.
2,600 to 7,500 cu. ft. at $1.35.
7,600 to 10,000 cu. ft. at $1.30.
10,100 to 15,000 cu. ft. at $1.20.
15,100 cu. ft. and over at $1.10.
25,100 cu. ft. and over at $1.00.

A discount at the rate of 10 cents per 1,000 cu. ft. will be allowed for payment on or before the 10th of the month.

Minimum charge, 60 cents per month per meter.

Application Filed by Clarksburg Company for Increase

In an application made by the Clarksburg, W. Va., Light & Heat Company to the State Public Service Commission, changes are proposed both in price and service of natural gas to be furnished all classes of consumers in and about the city of Clarksburg.

The proposed changes and schedule of rates are as follows:

"Class I—(Domestic consumers) 30 cents per 1,000 cu. ft., less a discount of two cents for payment on or before the tenth day of the month following that in which the gas was consumed.

"Class II—(Public utilities, office buildings, etc.) 20 cents per 1,000 cu. ft., less a discount of two cents for payment on or before the twentieth of the month following that in which the gas was consumed.

"Class III—(Manufacturers and other large consumers). All service and rates withdrawn."

$2 Rate Sought by Long Island Lighting Company

Unable to make a charge of $1 per month per meter through application to the Public Service Commission, the Long Island Lighting Company, with a plant at Sag Harbor, L. I., supplying that village and Southampton, has petitioned the village trustees for an amendment of franchise. The company wants to make a minimum charge of $1 per month per meter and a charge of $2 for each 1,000 cu. ft. of illuminating gas from Nov. 1 to a period one year after the war ends. The present charge in Sag Harbor is $1.75 and a slightly less rate is charged at Southampton, although the gas is made here and piped ten miles to that village.

Court Rules Rates Fixed by Legislature Must Stand

The Public Service Commission was notified to-day that the Appellate Division for the Third Division had handed a unanimous decision reversing the order of Justice Hasbrouck at Special Term in the case of the Municipal Gas Company of Albany, involving the rights of a gas company to obtain an injunction relieving it from charging the rate fixed by the Legislature for gas.

The Legislature in 1907 fixed a minimum rate of $1 for gas within the city of Albany. A few weeks ago the company started suit, claiming the $1 rate was confiscatory. Justice Hasbrouck gave the company a temporary injunction, which enabled the company to put the $1.50 rate in effect pending trial of the case. The city of Albany appealed to the Appellate Division, and the Public Service Commission for the First District, fearing a precedent for similar suits and "temporary injunctions," invalidating New York City's "80 cent law," directed its counsel to intervene in the Albany case and challenge the correctness of Judge Hasbrouck's rulings. The commission's counsel, ex-Judge William L. Ransom, obtained leave from the Appellate Division to intervene, and yesterday's decision sustained the contentions made by the Public Service Commission for the First District. The Albany company will have to go back to the $1 rate fixed by the Legislature.

It was said at the offices of the

commission to-day that if the ruling of the Appellate Division is upheld by the Court of Appeals it will prevent further efforts by local gas companies to charge more than the rate fixed by the Legislature.

Gas Engineering Section of Western Society of Engineers Opens with 40 Members

Officers Elected—First Meeting to Be Held Jan. 8

Tuesday evening, November 12, marked the beginning of the Gas Engineering Section of the Western Society of Engineers with forty members. The following officers were elected for the coming year: Chairman, H. H. Clark, secretary of the Illinois Gas Association; vice-chairman, C. C. Boardman, assistant engineer Western United Gas & Electric Company of Aurora, Ill.; directors, George H. Luks, Public Service Company; Harold Almert, consulting engineer, at present Director of Conservation for the United States Fuel Administration, and C. K. Baldwin, vice-president of the Robins Conveying Belt Company.

The first meeting of the new organization will take place Jan. 8. Meetings will be held on the second Wednesday of every second month thereafter, not including the summer months of June and July.

Prof. S. W. Parr, of the University of Illinois will lecture at the January meeting.

Pacific Gas & Electric Company to Issue $5,000,000 Bonds

The California Railroad Commission recently authorized the Pacific Gas & Electric Company to issue $5,000,000 of its 5 per cent. general and refunding mortgage bonds payable Jan. 1, 1942, or $5,000,000 of its 6 per cent first preferred stock, or portions of each aggregating $5,000,000. The bonds are to be sold at not less than 85 per cent of the face value and the stock at not less than $82.50 per share.

The proceeds of the stock or bond sales are to be used to reimburse the company's treasury for capital expenditure made before May 1, 1918, and to finance future construction work.

The company showed that it has made capital expenditures of $3,504,255.57 against which no stock or bonds have been issued and it estimates the cost of new construction expenditures at $5,785,163.

September Earnings of Dallas Gas Company

Total net earnings of the Dallas Gas Company for September were $1,967.06, an increase of $2,925.69 over the total net earnings for August. This was shown in the report for the two months completed Friday by Grover C. Bland, chief accountant of the Supervisor's office.

During August the net earnings were at the rate of 3.95 per cent return on the property value and in September the return was increased 5.22 per cent. The company, under its charter provisions, is allowed a return of not exceeding 8 per cent.

Total gas sales for September through the Dallas company were $68,914.04, an increase of $3,313.32 over August. The operating expenses for September totaled $12,058.01, a decrease of $1,480.16 over August.

"Comparing the eight months' operation ending Sept. 30, total gas sales showed an increase of 21.16 per cent, operating expenses an increase of 9.6 per cent (practically all of which is represented by increases in taxes) and not earnings, an increase of 47.18 per cent," Mr. Bland stated.

Fuel Administration Limits Supply of Gas to Free Consumers

The Fuel Administration, through its Bureau of Oil Conservation, sent letters recently to all natural gas companies in West Virginia, Ohio, Pennsylvania, Kansas, Oklahoma, Kentucky, New York, Arkansas, Louisiana and California requesting that free consumers be limited to 200,000 cu. ft. of natural gas per annum, and calling for a report of results accomplished on Dec. 1.

By free consumers is meant those users of natural gas who are relieved of payment because they have wells or pipe lines on their property. Up to this time the average consumption of free users in West Virginia alone has been 480,000 cu. ft. per consumer per year. This is regarded by the Fuel Administration as causing a waste of at least 350,000 cu. ft. per consumer per year.

In addition to limiting free consumers the Fuel Administration further requests that the use of all open or flambeaux lights be stopped, and that all other wasteful practices by consumers be eliminated. The natural gas companies are informed that to properly carry out these requests it will be necessary to place meters on a free consumer's service lines.

In many instances boom towns in the gas fields have held out the inducement of supplying free gas or supplying it at ridiculously low prices to industries that would locate there. This is especially true of West Virginia and has resulted in depriving many domestic consumers of an adequate supply of fuel for household use. It is estimated that there are 4,400 free consumers in West Virginia and that the amount of waste from this source is 1,540,000,000.

Petition Filed for Increase by Alton Company

The Alton (Ill.) Gas & Electric Company has filed a petition with the State Board asking for a second increase in gas rates in Alton. Recently a petition was filed asking that the rates be raised from $1 per 1000 cu. ft. to $1.25 per 1000.

The new petition proposes to charge "step rates," graded according to the amount of gas used and a charge of $1.50 per 1000 ft. of gas consumed in pre-payment meters.

Complaint Received by Chicago Company and Bills Rendered at Increased Rate

Errors Made Due to Inability to Secure Efficient and Experienced Meter Readers, Company Declares

The Chicago city council has taken three separate actions in an effort to stop alleged exorbitant gas bills and consequent complaints. Indications point to another legal battle between the People's Gas Light & Coke Company and the authorities of Chicago, which promises to be exceedingly bitter. One of the actions came in the shape of a resolution asking the council committee on gas, oil and electric lights to make an investigation of the excessive charges against consumers. This resolution asked that the committee ascertain the methods used by the People's Gas Light & Coke Company in computing its bills and to report a plan of investigation.

The second resolution asked the law department to give an opinion as to whether the said council has any rights left in the matter of control over rates and service furnished by the gas company. This resolution, after reciting the causes of complaint, orders:

"That the corporation counsel be and he is hereby directed to advise this council at as early a date as possible what measure of control, if any, the city council has over the rates and service of the People's Gas Light & Coke Company, in view of the recent decision rendered by the Supreme Court in the so-called 'Sutter case' and the recent action by the State public utilities commission in granting authority to the People's Gas Light & Coke Company to increase gas rates, to the end that if the city council has any authority in the premises action may be instituted to protect the gas consumers and that if the city council is without authority the gas consumers may be able to place responsibility and blame where it belongs."

The third resolution which was referred to the judiciary committee is as follows:

"Resolved, That the ctiy council of Chicago urgently requests the State Legislature of Illinois to repeal the act creating the State public utility commission and to enact legislation which will confer complete home rule on the city of Chicago over its public utilities, and be it further

"Resolved, That copies of this resolution be sent to each member elect of the Illinois State legislature and to the governor of Illinois."

Boetius H. Sullivan, attorney for the gas company, declares that the complaints about high gas rates are mainly due to inefficient meter reading or the failure to read meters at all. He said:

"The company is doing the best it can to correct blunders and has discharged most of the persons responsible for these conditions. The discount privilege is not lost during the time complaints are being investigated, and neither is the gas being shut off during this period.

"More than 2,000 refunds were made by the company for blunders discovered during June and July. Some of the complaints were not justified, but the company is working as fast as it can to correct conditions and make proper adjustment."

The actions are the result of hundreds of recent complaints by consumers and allegations by Fred. W. Abels, city gas supervisor, that inaccurate charges are due to conditions susceptible of remedy in the gas company's bookkeeping and meter reading departments.

The aldermen seeking an inquiry declared they have received many complaints and have heard of many others. They said there has been considerable discussion of the situation among all the councilmen.

Mr. Abele's charges are based on assertions that hundreds of bills rendered by the gas company have been excessive, hundreds were for less gas than was actually consumed, and that practically all the bills for a certain period were rendered on estimates instead of meter readings.

"In many cases incompetent employees in the meter department never looked at the meters, but simply guessed at the charges and put some figures in their books," Mr. Abele declared.

The city's supervisor asserts that in many cases where estimated bills were rendered for less gas than was consumed the patron was later charged for the actual amount of the gas consumed on the increased rates recently granted the gas company. This, he says, was wrong, because the gas was consumed before the increase was granted.

Report of Geological Survey on Production and Shipment of Coal and Coke

Weekly report on the production and shipment of bituminous coal, shipments of anthracite coal, beehive and by-product stocks compiled by the Geological Survey, Department of the Interior, November 16, 1913, is given in part:

The downward trend of production of bituminous coal, which began after the record production during the week ended Sept. 28 when the output exceeded 13,000,000 net tons, not only continued through the week of Nov. 9 but brought the output during the current week, which is estimated at 10,409,000 net tons, below the production of the corresponding week of 1917, for the first time during the present coal year. It will thus be seen that the influenza epidemic together with the observance of election day during the past week, and the celebration of the signing of the armistice, caused a decrease in the weekly production during a period of six weeks of over two and one-half million net tons.

The average daily production during the week of Nov. 9 is estimated at 1,735,000 net tons, as compared with 1,811,000 net tons during the week of Nov. 2, and 1,845,000 net tons during the corresponding week of last year. For the 1918 coal year to date, the daily average is estimated at 1,976,000 net tons, as compared with 1,758,000 net tons, and it is now necessary, under the budget as just revised by the Fuel Administration, to produce daily during the balance of the coal year to make up for the past deficit, 2,034,000 net tons, 58,000 net tons, or approximately 3 per cent in excess of the average daily production for the period April 1 to Nov. 9.

The total production for the coal year to date is estimated at 379,364,000 net tons, as compared with 337,532,000 net tons during the same period of 1917, an increase of 41,832,000 net tons, or 12.5 per cent.

The holidays which further limited production of bituminous coal had no effect on the production of anthracite, the output during the week of Nov. 9 exceeding the preceding week by 87,000 net tons, or 5.8 per cent. The production of anthracite during the current week is estimated at 1,587,000 net tons, as compared with 1,500,000 net tons during the week of Nov. 2 and 2,041,000 net tons during the week of Nov. 9, 1917. The average daily production is estimated at 265,000 net tons, as compared with 329,000 net tons for the coal year to date, and as against 33,000 net tons during the same period of last year.

Total production of anthracite from Apr. 1 to Nov. 9 is estimated at 82,176,000 net tons, 704,000 net tons, or 1.2 per cent behind the 1917 production.

	Net Tons
Average daily requirements established by the U. S. Fuel Administration, April 1, 1918, to March 31, 1919 (Revised Nov. 16, 1918)	1,998,000
Average daily production, April 1 to Nov. 9, 1918	1,976,000
Average daily production necessary during period Nov. 9, 1918, to March 31, 1919, to make up deficit for coal year to date	2,034,000

ESTIMATED UNITED STATES PRODUCTION OF BITUMINOUS COAL

Total Bituminous, Including Coal Coked

	1918		1917	
	Week	Coal Year to Date	Week	Coal Year to Date
Oct. 26 (a)	11,314,000	358,092,000	10,804,000	315,528,000
Nov. 2 (a)	10,863,000	368,955,000	10,893,000	326,461,000
Daily average	1,811,000	1,984,000	1,816,000	1,755,000
Nov. 9 (b)	10,409,000	379,364,000	11,071,000	337,532,000
Daily average	1,735,000	1,976,000	1,845,000	1,758,000

(a) Revised from last report (b) Subject to revision.

CARLOADS BITUMINOUS COAL SHIPPED FROM PRODUCING DISTRICTS

	Week Ended			Year to Date	
District—	Nov. 9, 1918	Nov. 2, 1918	Nov. 9, 1917	1918	1917
Central Pennsylvania	29,535	30,035	31,965	1,493,664	1,411,323
Western Pennsylvania	7,743	8,336	8,795	428,429	355,220
Cumb., Pied. and Somerset	7,454	6,462	7,698	325,825	303,686
Fairmont	6,346	6,123	5,723	278,091	234,559
Michigan	517	695	567	25,845	25,210
Ohio	22,162	23,689	21,234	1,047,263	873,218
N.E. Kentucky, high vo. of S.W. Va. and smokeless fields of West Virginia	23,017	22,692	24,366	1,170,151	1,143,974
Southwest Virginia	2,199	2,228	2,583	108,286	100,036
Tennessee and Kentucky	10,982	10,201	12,133	553,335	470,369
Alabama	3,176	3,053	3,787	160,212	155,658
Illinois, Indiana and W. Ky.	42,298	47,586	51,390	2,141,561	2,009,622
Iowa, Texas and S.W. States	11,089	13,171	14,360	630,861	604,243
Rocky Mts. and Pacific Coast States	11,127	12,154	12,958	556,731	521,351
Total	177,639	186,423	197,559	8,920,254	8,208,469

Carriers' reports for the week ended Nov. 9 show a falling off in shipments from all districts with the exception of the district including Cumberland, Piedmont & Somerset, Fairmont, the district including N. E. Kentucky and Southern West Virginia, Tennessee & Kentucky and Alabama. No material gain was made in the districts reporting improvement, while material decreases were noted in Ohio, the district including Illinois, Indiana & Western Kentucky and in the Western and Rocky Mountain States.

Bituminous coal dumped at lake ports during the week ended Nov. 9 (including bunker), is estimated at 810,432 net tons as compared with 826,224 net tons, or a decrease of approximately 2 per cent. While the current week's tonnage is considerably below the weekly average from July 1 to date, it is nevertheless equivalent to the requirements as outlined by the Fuel Administration for this period of the year, and it is probable that even with the closing of the Lake season, as early as Nov. 23, the full budget amounting to 29,500,000 net tons will be met.

Shipments of bituminous coal to New England during the week ended Nov. 9 were 445,242 net tons and fell 7 per cent below the shipments during the preceding week. Of this total, rail receipts, amounting to 139,968 net tons, exceeded the receipts during the preceding week by 17.6 per cent, while tidewater shipments, amounting to 305,274 net tons, fell behind the performance of Nov. 2 by 14 per cent. The decrease in tidewater shipments is attributed to the decline in tonnage loaded from New York and Philadelphia, the decrease from these harbors, this week compared with last, amounting to 34 per cent. Baltimore tonnage again exceeded the weekly average for the coal year to date, while all other harbors, as well as rail receipts were below this average.

Figures on operating conditions for the first nine months of the calendar year 1918, available at this date are as follows:

Beehive Coke

The production of beehive coke in the United States during the week ended Nov. 9 is estimated at 559,000 net tons, approximately the same as the week preceding, but 16,000 net tons or 3 per cent below the corresponding week of 1917. The average daily production during the current week is estimated at 93,000 net tons as compared with 96,000 net tons during the week of Nov. 9 of last year.

The operators in the Connellsville, Greensburg and Latrobe districts of Pennsylvania report production during the week of Nov. 9 at 318,988 net tons, and the operation of their plants at 69.6 per cent of full time as compared with 73.1 per cent during the week preceding. The limiting factor was labor shortage, brought about to some extent by the celebration of Election Day and the signing of the armistice.

The same operators produced 175,400 net tons of coal.

By-Product Coke

The production of by-product coke during the week of Nov. 9, estimated at 582,468 net tons, while slightly in excess of the week preceding, exceeded every previous week in history with the exception of the week of Oct. 5, when by-product coke production reached the high mark of 585,232 net tons. The current week's production, however, exceeded the output during the same week of 1917 by 139,245 net tons or 31 per cent. Operating conditions during the week of Nov. 9 were slightly better than those reported for the week preceding, the plants of the country being operated at 90.2 per cent as compared with 89.7 per cent. Repaired plants brought about the improvement which occurred, but still remained the real factor limiting production, the loss of full time attributed to that cause being reported at 5.8 per cent.

Operators in Alabama, Kentucky, Maryland and Ohio report an in-

	1917	1918						
					Percentage Time Lost on Account			
Period—	Production (net tons)	Production (net tons)	% Full Time Operated	% Time Lost	Car Shortage	Labor Shortage	Strike	Other
First quarter	137,188,617	135,624,258	67.0	33.0	24.0	2.2	0.2	6.6
Second quarter	135,765,418	149,275,979	75.2	24.8	12.1	6.0	0.2	6.5
Third quarter	138,771,754	163,076,737	83.0	17.0	7.2	4.4	0.1	5.3
Total nine months	411,725,789	447,975,974	75.6	24.4	13.9	4.3	0.1	6.1

PRODUCTION OF BEEHIVE COKE AND OF COAL, WITH CAUSES OF LOST TIME AS REPORTED BY OPERATORS IN THE CONNELLSVILLE, GREENSBURG AND LATROBE DISTRICTS, PA.

	Coal for Shipment			Coke				
	Week Nov. 2	Week Nov. 9		Week Oct. 19	Week Oct. 26	Week Nov. 2	Week Nov. 9	
	Per Cent	Per Cent	Tons (coal)	Per Cent	Per Cent	Per Cent	Per Cent	Tons (coke)
Capacity based on railroad rating	100.0	100.0	368,900	100.0	100.0	100.0	100.0	458,393
Production	49.7	47.5	175,400	75.1	73.9	73.1	69.6	318,988
Losses:								
All causes	50.3	52.5	193,500	24.9	26.1	26.9	30.4	139,405
No coal cars	10.2	8.3	30,450	....	....	....	....	....
No coke cars	....	....	....	2.5	3.8	5.0	4.8	21,865
Labor shortage	36.3	40.1	147,800	20.9	19.2	20.4	24.2	110,880
Plant disability	0.9	0.5	1,950	....	....	....	0.4	1,887
All other causes	2.9	3.6	13,300	1.5	3.1	1.1	1.0	4,773

crease in production over the week of Nov. 2. In Alabama and Kentucky the improvement is attributed to repairs to plants, in Maryland to better labor conditions, and in Ohio to both. Material falling off in production occurred during the week in Massachusetts and New York. In the former State necessary repairs to plants was the limiting factor, while in the latter State both labor shortage and repairs to plants prevented greater production.

Standard Gas & Electric Company's Affiliated Concerns Report Large Expenses

The statement of earnings of the utility properties, in which the Standard Gas & Electric Company is wholly or partially interested, continues to show heavy expenses. For the month of September almost the entire increase in gross revenues was absorbed by the deductions, while for the twelve months ended Sept. 30 last the deductions more than wiped out the gross gain.

For the month the gross earnings of the properties amounted to $1,813,781, compared with $1,482,995 in 1917, an increase of $330,786. Expenses, etc, totalled $1,189,561, against $864,507, a gain of $325,054, so that the net earnings amounted to $625,220, contrasted with $618,488, an increase of only $5,732.

Gross revenues for the twelve months ended with September totalled $22,056,948, against $18,595,767 in the corresponding period of the previous year, an increase of $3,461,181. Expenses, etc., amounted to $13,464,743, contrasted with $9,953,467, a gain of $3,511,276. This caused a decrease of $50,095 in the net earnings, the total this year being $8,592,205, compared with $8,642,300 in the preceding twelve months.

Indianapolis Company Continues Practice of Making Its Situation Clear to the Public

The Citizens Gas Company, of Indianapolis, has just issued another of its bulletins to the public, through which it has recently been so efficaciously presenting its side of the war situation. The statements also result in much better public understanding of the general problems of the gas company, and already the attitude of the general public toward the company has taken a decidedly more understanding tone.

The statement just issued was made in the form of an advertisement in all the Indianapolis newspapers, as reproduced herewith.

THE COLONIAL OIL COMPANY directors will meet this month to declare a final dividend in dissolution, which is expected to amount to about $30 a share. This will make the third dividend, the two previous ones having totaled $150 a share.

The City's Gas Supply
IN WAR TIME

COST OF INCREASED SUPPLY

Last week we explained our present gas-producing condition and the increased capacity which is to be made available about the beginning of 1919.

Last spring we began the enlargement of our plant in order to increase our supply of gas to the extent of about 4,000,000 cubic feet per day.

These improvements will cost about $1,500,000. We did not want to make them. As a business undertaking they were not justified. The public Service Commission decided that they were not worth more than about $650,000 as an investment, and ordered us to write off at least $100,000 a year until they were brought down to a normal basis.

To assist us in making this plant extension the Public Service Commission restored our old rate of 60 cents for gas. This increase in the price of gas adds nothing to our net income, as interest on the new investment and the amortization of excess cost will absorb more than the additional gas revenue.

The improvements are being made solely in the interest of better service. When completed, our service can be greatly improved, provided the people do not increase their consumption of gas for heating purposes. If they do, we shall still be obliged to manufacture a great deal of water-gas, which will prevent us from giving good service and will force us to ask for an increase in the price of gas.

Last month we sent out 275,000,000 cubic feet of gas, which was the largest quantity ever required in a single month in this city. Our service was fairly good, but we were obliged to exert ourselves to the utmost to maintain it. And one-third of the gas sent out was water-gas on which we lost money.

We have now reached the season when all furnaces and stoves should be started up. Do not depend upon gas for heating. If you do, there is danger that there will not be enough for more important uses.

Germany may accept Foch's terms immediately, but we shall have to work and live under war conditions all this winter.

Citizens Gas Company

Heating Load of Western States Gas Company Increases as Winter Approaches

The Western States Gas & Electric Company has received increasing demands at Stockton, Cal., for gas for heating purposes and for gas heating appliances as winter approaches. Three large baking ovens in the largest bakery in the city, and a hotel range of a large cafeteria are included in its recent large installations of gas for industrial purposes. Consumption of gas by the baking ovens will approximate 100,000 ft. of gas per month.

Old Ohio Cities Building at Columbus Leased to Brokers

The "gas building" at the northwest corner of Long and Front Streets, Columbus, Ohio, formerly occupied by the Ohio Cities Gas Company and the Columbus Gas & Fuel Company, has been leased for ninety-nine years by the Dutton-Herron Company, merchandise brokers.

Soldiers and Sailors to Get Back Old Positions

Empire State Gas & Electric Association Making Canvass of Suitable Positions for Crippled and Disabled

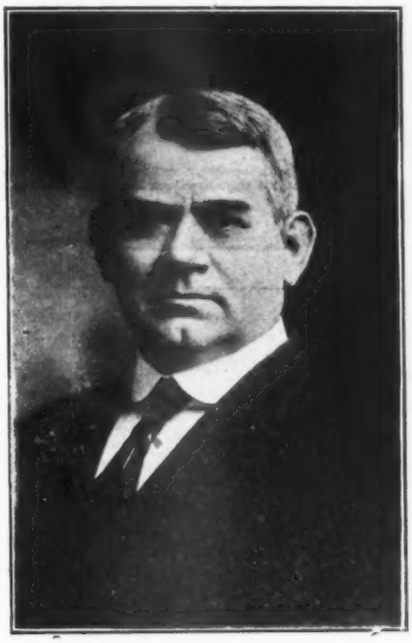
Thousands of soldiers and sailors who used to help light the cities of New York State will be welcomed back to their old jobs, just as soon as they are mustered out of service, it was declared by the officers of the Empire State Gas & Electric Association. It is intended that no man who fought in France shall suffer in his chance for place or promotion on account of draft or enlistment.

Recommendations for reinstating these employees are being formulated following conferences with reconstruction authorities. In spite of the lightless night, daylight saving, and other war-time restrictions, they are ready to find a place for every man who answered his country's call.

For fighters who have been crippled and partially disabled a careful canvass of suitable jobs is now being made by every member of the Empire State Gas & Electric Association. Wherever a disabled soldier can hold down any position, it is promised that it will be held open for him.

Personal Notes

JAMES W. DUNBAR, who resigned his position as assistant to the president of the Utica Gas & Electric Company of New Albany, Ind., to run for Congress at the recent election, has been successful. Mr. Dunbar had been with the company at New Albany ever since he was 11 years old, having entered the employ as a gas lamp lighter, his relation with the company extending over a period of forty-six years of



JAMES W. DUNBAR

continuous employment. He was secretary of the Western Gas Association in 1894-1906, secretary of the American Gas Institute 1906-1908, president of the Indiana Gas Association 1908-1909, and has been secretary-treasurer of the Indiana Gas Association since 1914. In January, 1914, he had the distinction of having been elected or holding three offices of public trust at the same time—Presidential elector elect for the State at large, school trustee elect in the city of New Albany and a member of the board of sinking fund commissioners for Democratic council and appointed sinking fund commissioner by a Republican mayor. He was a Grand Master of Masons in Indiana in 1902.

I. C. COPLEY, president of the Western United Gas & Electric Company, Aurora, Ill., was elected to Congress at the recent election. Mr. Copley is well known in the gas industry, having been president of the Western Gas Association in 1900.

W. E. VANDELL, formerly assistant superintendent of the Fitchburg (Mass.) Gas & Electric Light Company, has been appointed superintendent, succeeding G. Warren Stiles.

JOHN F. WESSEL, vice-president of the United Gas & Electric Engineering Corporation, has been appointed chief engineer of the corporation, succeeding L. J. Hirt. Mr. Wessel takes over these new duties in addition to his former work.

J. WEAVER SMITH, industrial fuel salesman for the Citizens Gas Company, Indianapolis, Ind., has been appointed superintendent of appliances. Prior to going to Indianapolis Mr. Smith was industrial fuel salesman for the Elkhart (Ind.) Gas & Fuel Company.

J. LESLIE THOMPSON, assistant auditor of the Danbury (Conn.) & Bethel Gas & Electric Light Company, has resigned that position to take a position in the office of the division engineer of the New York, New Haven & Hartford Railroad. Mr. Thompson is one of the oldest members of the force of the local lighting company in years of service, having been with the company nearly thirteen years. He was for a number of years one of the company's cashiers, and by his unfailing courtesy and consideration made many friends among the patrons of the company.

EDWARD HAMPTON BROWNELL, who became a partner in the firm of E. P. Reichhelm & Company, Inc., 26 John Street, New York City, in 1907, died Oct. 14. Mr. Brownell was treasurer of that corporation and the American Gas Furnace Company, and vice-president and treasurer of The American Swiss File & Tool Company of Elizabeth, N. J.

INEZ E. COALE has been appointed assistant to E. J. Burke, commercial manager of the Citizens Gas Company of Indianapolis, Ind.

W. J. Reagan, who has been connected with the sales department of the Utica (N. Y.) Gas & Electric Company for several years, has been appointed to the position of commercial manager of that company, in charge of all electrical sales and the sale of electrical appliances. He will have complete charge of contracting both for electric light and power. He is to have charge not only of the contracting for electrical requirements, but also of the general advertising, publicity and contracting for street lighting.

H. B. Wagner, manager of the Gratiot County Gas Company, Alma, Mich., who has been in the southern states for the past six weeks looking after his gas interests in that section of the country, has recently returned to his home in Alma.

The Brooklyn Union Gas Company recently held its annual meeting at the company's offices, No. 165 Remsen Street, Brooklyn, N. Y. Colonel William M. Dyckman presided and directors re-elected were William J. Rockefeller, Henry Pierrepont, E. R. Chapman, James H. Jourdan and David Leggett.

Construction Notes

Canadian Steel Plant Soon to Be in Full Operation

Approximate Capacity of 500,000 Tons of Coal Yearly

The new by-product coke oven plant of the Steel Company of Canada, at Hamilton, Ontario, will soon be in full operation.

The plant consists of eighty thirteen-ton Wilputte Regenerative By-Product Coke Ovens, arranged in two batteries of forty ovens each.

The contract date of completion called for the first battery to be put in operation on Nov. 15, and in spite of all difficulties, due to abnormal conditions, the first battery was charged on the date stipulated in the contract.

The date for the charging of the second battery is Dec. 15. They have already had fire in them for about ten days, and it is expected that the second battery also will be charged on contract time.

The installation is complete, including by-product plant, coal and coke handling, boiler plant, etc., and will have a capacity of approximately 500,000 tons of coal per annum. The plant was designed and constructed by the Wilputte Coke Oven Corporation, New York.

Portland Company to Build $75,000 Addition to Its Briquetting Plant

The Portland Gas & Coke Company has been granted a permit to build a $75,000 addition to its briquetting plant at Linnton, Ore. This permit was obtained through the local division of the war industries board and is considered as indirect war construction. It is understood that the addition will rise at once.

New Franchise for Grand Rapids Company to Be Considered

As the Grand Rapids (Mich.) Gas Company's franchise expires in May, 1920, City Commissioner Daniel Kelley, chairman of the franchise committee, has arranged for a meeting with the heads of the company to discuss the question of a new franchise. This is done so that the city will know in sufficient time before the expiration of the company's franchise when it will apply for a new grant.

Some idea of the number of years the new franchise is to be operative also is wanted. It is probable that the rate subject will not be decided until 1920 as conditions at present are abnormal and may return to normal by that time. However, the commissioners feel that the city should have some general idea beforehand what the company intends to do about a new franchise.

Earnings All Byllesby Properties

Gross and net earnings of Byllesby combined properties for the month of September, 1918 and 1917, and for the year ended September 30, 1918 and 1917, are shown below:

	1918	1917	Increase
Month of September—			
Gross earnings	$1,813,781	$1,482,995	$330,786
Net earnings	624,220	618,488	5,732
Year ended Sept. 30—			
Gross earnings	22,056,948	18,595,767	3,461,181
Net earnings	8,592,205	8,642,300	*50,095

*Decrease.

Careless Workman Sets Well Afire—Burns 24 Hours

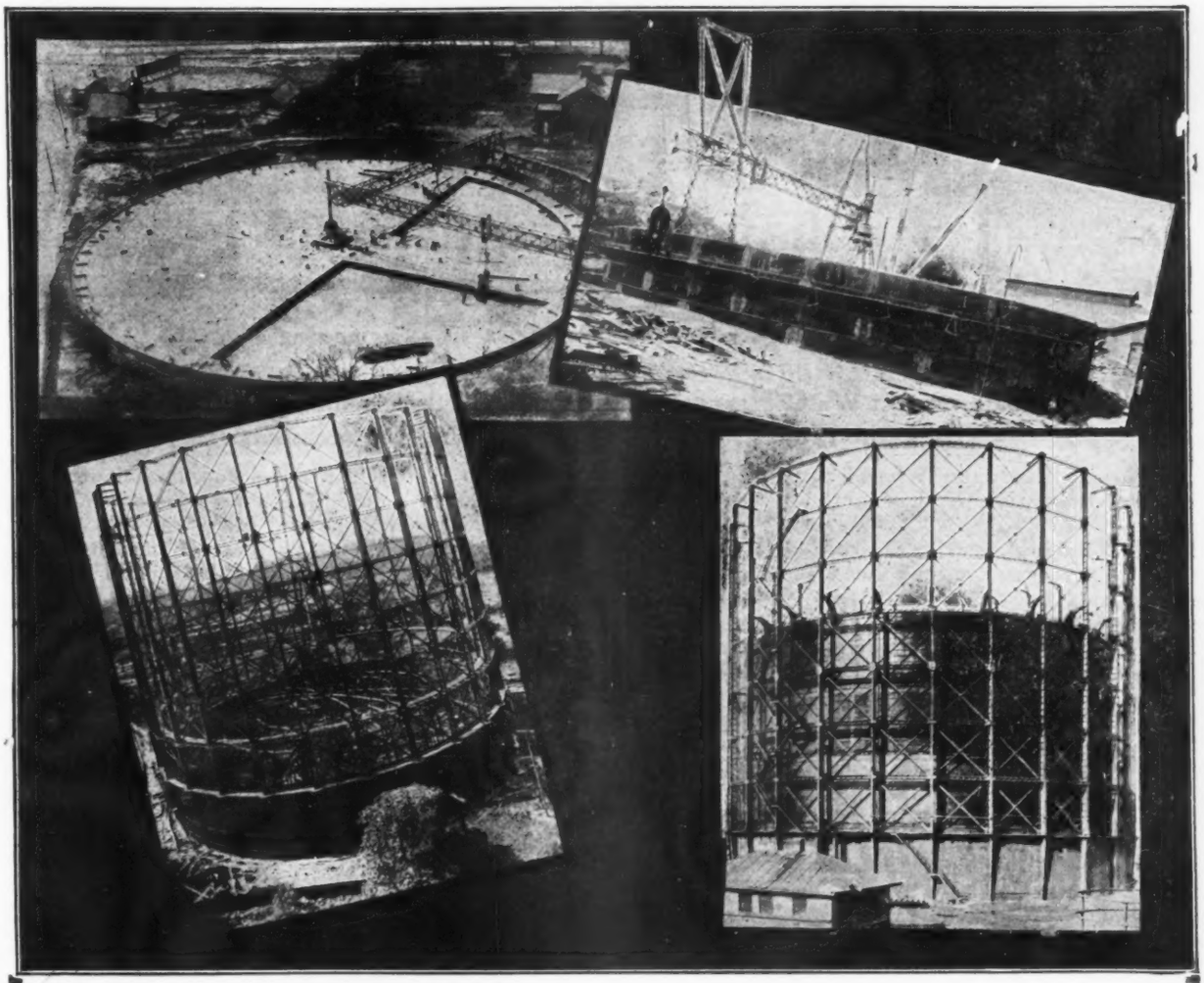
After more than 24 hours of hard work by workmen of the field and members of the city fire department, a fire which originated in well No. 173 on the Young lease at Cedar Grove, La., and which, for a time, threatened to destroy the entire field, was extinguished Nov. 14. The rig of the contracting firm, Terver & Dickinson, towering above the well, and much of the machinery was destroyed. Damage is estimated at less than $3,000.

Carelessness of a workman in lighting a cigarette caused the blaze, which gained considerable headway and was beyond local control when assistance was asked from the Shreveport fire department. One of the fire trucks was immediately rushed to the scene, and the fire was extinguished by construction of mud banks around the blaze and pumping water into the drill stem.

The Pittsburgh Oil & Gas Company reports for nine months ended Sept. 30 show earnings of $721,845; expenses $423,684; tax reserves $25,352; amortization reserve $59,576; dividends during period $120,000, and net surplus $93,233.

The Consumers Gas Company of Toronto, reports for the year ended Sept. 30 last: Total income $5,095,006; toal expenses $4,318,-341; net profits $776,665; interest $34,329; balance $742,336; dividends $530,645; surplus $211,692; plant and buildings renewal fund $490,791; deficit $279,499; previous surplus $684,956; final surplus $405,857. The balance sheet as of Sept. 30 last shows cash in bank and offices of $141,073; accounts receivable $372,088; sundry accounts payable $245,957 and total assets and liabilities of $11,744,397.

The New Franklin Oil & Gas Company, Nowata, Okla.; capital $6,000; incorporators C. R. Estell, H. R. Harris, New Franklin; J. A. Tillotson, Nowata.



RITER-CONLEY COMPANY

STEEL CONSTRUCTION

PITTSBURGH

GAS PURIFYING MATERIALS

NATRONA RED ORE
To Be Mixed With Fluffing Material

MINERAL SPONGE
The Best Fluffing Material

MINERAL SPONGE OXIDE
Prepared for Use

PENNSYLVANIA SALT MFG. CO.
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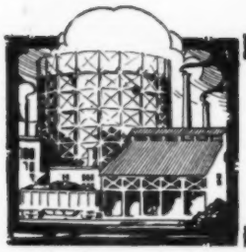
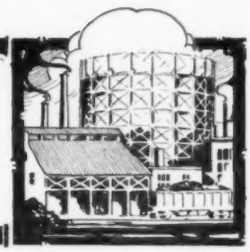


With The Equipment & Appliance Manufacturers



Conducted by Business Department of American Gas Engineering Journal

What the Salesman of Water Heaters Should Get from the Customers in Order to Sell Them the Proper Apparatus to Meet Their Requirements

The Long - Landreth - Schneider Co., New Brunswick, N. J., manufacturers of "Kompak" Water Heaters, have just issued a card of instructions to gas company salesmen on "How to Sell Automatic Instantaneous and Automatic Water Heaters." They say that "the secret of success in selling appliances is satisfied customers. Satisfaction is acquired by making the customers thoroughly acquainted with the appliance before the sale is made. This is particularly so with automatic instantaneous water heaters on account of certain particular features they possess. Bringing these features to the attention of your prospect will not jeopardize the sale and will assure a one hundred per cent satisfied customer.

Automatic Instantaneous Water Heater

Let us enumerate these features. Automatic instantaneous water heaters; first, will furnish as much hot water as they can instantaneously heat; second, they reduce the water pressure; third, they require a large gas service.

We will now explain why prospects should be informed about these features.

Many people have been accustomed to getting their hot water from a tank heated by their kitchen range or the furnace. As long as hot water was in the tank it could be drawn as fast as they wanted it, that is, at full city pressure. Your prospect is therefore probably accustomed to a rapid flow of hot water. Now when he buys an automatic instantaneous water heater and pays what he believes to be a good price for it, unless he be duly informed, he will be disappointed if hot water is furnished at a reduced flow. It is therefore advisable to draw water from a faucet, regulate the flow to the capacity your prospect's heater will have, and demonstrate just how big a flow of hot water can be drawn during the summer season. Then explain that in winter, the water being colder, the flow will have to be reduced; and then demonstrate just how big a flow the heater will deliver in winter. Impress upon your prospect that hot water, however, is available always and continuously. This will offset the reduced flow feature. Inform him also that when water is drawn from two or more faucets simultaneously the supply at each faucet will be proportionately divided.

On account of the fact that automatic instantaneous water heaters reduce the water pressure, and the supply of hot water is limited to the instantaneous capacity of the heater, it frequently happens that hot water cannot be drawn upstairs while it is being used below. If the city water pressure is very low it might even happen that hot water cannot be drawn upstairs at all; or if so, in such a small stream as to be unsatisfactory. It is then advisable to discourage the sale of an automatic instantaneous water heater.

Automatic instantaneous water heaters require a large gas service. Frequently the service to the house is not big enough. A new service will have to be laid, which means tearing up the lawn. Inform your prospect of this.

We wish to repeat for the sake of emphasis that bringing out these features beforehand will not jeopardize the sale, in fact, quite the opposite is true. It gives your prospect the impression that he is dealing with sincere people that know their business. He will know just what service to expect. Your sale will be a lasting, repeat order, successful sale.

We recommend that salesmen give the installation of the automatic instantaneous heater careful consideration. The location must be near a six or eight inch flue with good draft. The distance from the street service must not be too great, for a separate large gas line must be run to the heater. Is there a convenient place to put the large gas meter which is required? Study your local conditions. If check valves are required, inform your fitter so that he may come prepared, and thus avoid delay and unnecessary trips.

Automatic Storage Water Heaters

The selling of automatic storage water heaters is considerably more simple.

Excuses need not be made regarding the hot water flow, because hot water can be drawn from automatic storage water heaters at full city pressure, and at maximum faucet capacity. Summer and winter, upstairs and down, hot water can always be drawn in as big a stream as that coming from the cold water faucets. A full stream of hot water can be drawn from several faucets simultaneously. Water pressures do not come into consideration.

Automatic storage water heaters can be connected to the nearest half inch gas line. No separate service, no separate meter, are required. Only a three inch flue is needed. No reaction, no check valves, no condensation.

All that a salesman need inquire into is the size of the house. For houses with one bath, kitchen and laundry, recommend the No. 18 Kompak. For houses with large family, or houses with two or three baths, recommend the No. 32 Kompak."

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VOL
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1859 PUBLISHED WEEKLY 1918

AMERICAN GAS ENGINEERING JOURNAL

FORMERLY

AMERICAN GAS LIGHT JOURNAL

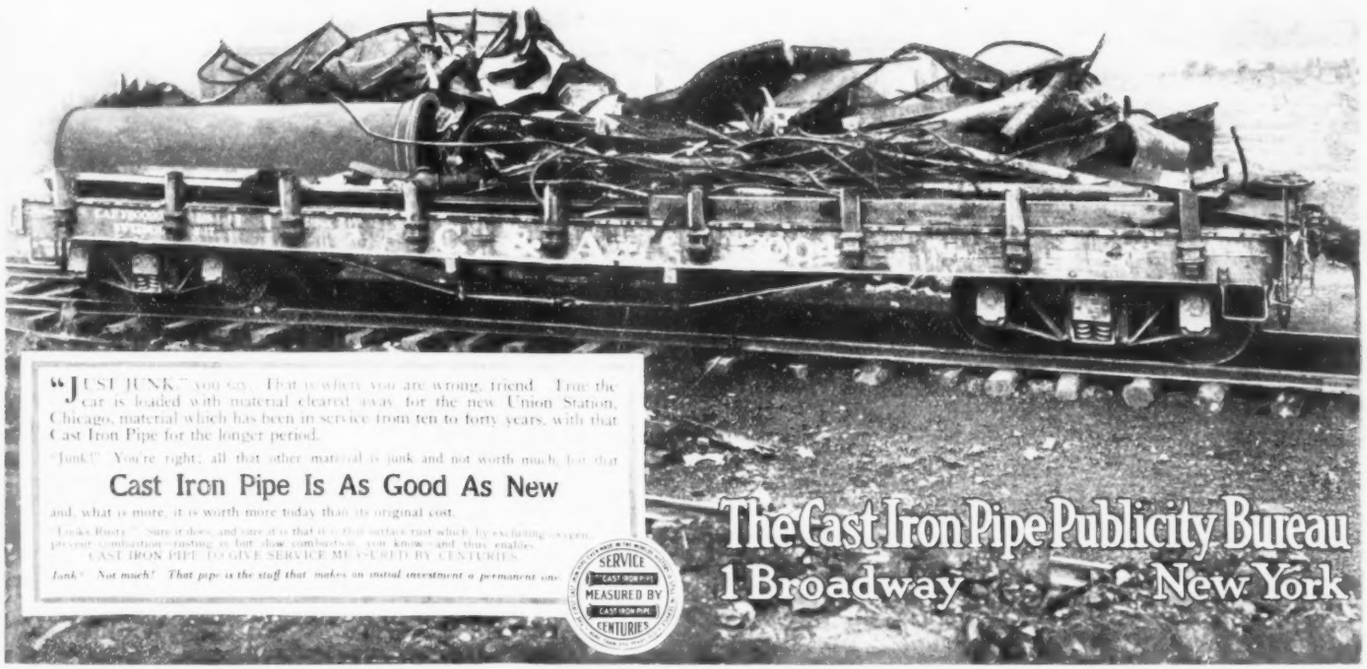
VOL. CIX., No. 22
WHOLE No. 3169

NEW YORK, SATURDAY, NOVEMBER 30, 1918

Subscription $3 per year
$4 Canada $5 Foreign

DEC 31918
Smithsonian Deposit

Not All Junk! *Look Again.*


"JUST JUNK" you say. That is where you are wrong, friend. True the car is loaded with material cleared away for the new Union Station, Chicago, material which has been in service from ten to forty years, with that Cast Iron Pipe for the longer period.
"Junk?" You're right; all that other material is junk and not worth much, but that
Cast Iron Pipe Is As Good As New
and, what is more, it is worth more today than its original cost.
"Looks Rusty." Sure it does, and sure does that it is that surface rust which by excluding oxygen, prevents combustion—rusting—is but slow combustion, you know—and thus enables
CAST IRON PIPE TO GIVE SERVICE MEASURED BY CENTURIES.
Junk? Not much! That pipe is the stuff that makes an initial investment a permanent one
SERVICE CAST IRON PIPE MEASURED BY CAST IRON PIPE CENTURIES
The Cast Iron Pipe Publicity Bureau
1 Broadway New York

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The Gas Machinery Co.

Cleveland, Ohio

BY-PRODUCT COKE PLANTS

COAL GAS PLANTS WATER GAS PLANTS

AQUA, SULPHATE and CONCENTRATED AMMONIA PLANTS

NOTE:—

This advertisement is only to keep you reminded of the

U. G. I. Vertical Retorts

The best system of coal carbonization in America today

Figures prove this and the guarantees of

THE UNITED GAS IMPROVEMENT CO., Philadelphia

Back it up

Entered as second-class matter January 9, 1917, at the post-office at New York, N. Y., under the Act of March 3, 1879.
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